THE COMPLEXITY OF TEEN PREGNANCY PREVENTION PROGRAM IMPLEMENTATION:

A MULTIPLE CASE STUDY INVESTIGATION

A Dissertation

by

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Submitted to the Office of Graduate and Professional Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

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August 2017

Major Subject: Health Education

ABSTRACT

Implementing teen pregnancy prevention programs is a complex process affected by intervention, organization, community, and policy-level factors. Adolescent health programs implemented with fidelity to core components from highly trained facilitators in community or school environment can improve overall sexual health outcomes. Qualitative cross-case analysis is a valuable analytic technique used to systematically review diverse evidence types and can be used for theory-building or conceptual contributions to the literature. System Dynamics (SD) is a theoretical perspective and method used to understand feedback mechanisms and leverage points which influence system structure and behavior over time. The purpose of this dissertation was to investigate implementation practices among pregnancy prevention programs with adolescents in the United States integrating traditional and systems thinking research approaches. To do so, we conducted one scoping literature review on teen pregnancy prevention implementation practices, investigated the 2010-2014 Office of Adolescent Health (OAH) Teen Pregnancy Prevention (TPP) Program cohort grantees implementation practices using cross-case analysis strategies, and qualitatively modeled system dynamics and feedback mechanisms which influenced pregnancy prevention program implementation.

The scoping literature review documented 23 studies investigating theoretical, procedural, and empirical evidence related to teen pregnancy prevention program implementation. The cross-case analysis used 29 case evaluation reports from the 2010-2014 OAH TPP Program to evaluate theoretical frameworks, applied research measures,

and contextual experiences which affected implementation among replication and innovative program models. The system dynamics model integrated existing and new evidence to deconstruct the endogenous factors and dominant feedback loops influencing teen pregnancy prevention program implementation.

Results from the three studies, the scoping literature review, cross-case analysis, and qualitative system dynamics map, assert important insights which can help researchers and practitioners understand the implementation process and enhance the evidence base in teen pregnancy prevention. Results suggest: (a) a foundation of literature describing theoretical, procedural, and empirical teen pregnancy prevention program implementation evidence exists; (b) a cross-case analysis investigating theoretical implementation frameworks, applied research performance measures, and exploratory perspectives and themes described replicated and innovative teen pregnancy prevention programs in the United States; and (c) a preliminary qualitative system dynamics model identified reinforcing feedback loop mechanisms and theorized causal relationships among factors affecting teen pregnancy prevention program implementation.

ACKNOWLEDGEMENTS

I would like to thank my committee chair, Dr. Kelly Wilson, and my committee members, Dr. Adam Barry, Dr. Patricia Goodson, Dr. Yorghos Apostolopoulos, and Dr. Kenneth McLeroy, for their direction, support, and encouragement throughout the course of this dissertation project.

To Dr. Kelly Wilson, thank you for every minute, conversation, tear, laugh, illness, opportunity, lesson learned, and example you've provide me over the course of my academic training! You've always believed in and trusted my abilities, even when I doubted myself. Much of my success is because of the mentorship and guidance you provided in research, teaching, and service and I strive to follow in your footsteps moving forward.

To Dr. Adam Barry, thank you for helping me grow and mature as a professional and emerging scholar! You elevated my career development preparation and tirelessly helped me navigate the job landscape with unbelievable ease. Your on-going mentorship has re-energized my love for higher education and I aspire to lead by example with honesty and integrity with my future students, as you have done with me.

To Dr. Patricia Goodson**,** thank you for helping me believe in myself and my abilities as a writer! Your unwavering support guided me through the process of becoming a writer and you have helped boost my confidence in more ways than you will ever know.

To Dr. Yorghos Apostolopoulos, thank you for your willingness to work and teach me about complexity science and systems. You welcomed my eagerness to learn with expertise and patience, working alongside to support my growth in understanding and using models. You push me to think bigger, more systematically about health issues and I am grateful for the time we spent working together.

To Dr. Kenneth McLeroy, thank you for always brining a unique perspective and expertise to our conversations. You continuously challenge me to think critically about health and model the interdisciplinary scholarship I hope to conduct throughout my career. I have learned so much under your guidance, thank you.

Thanks to all the faculty, students, and staff at Texas A&M University for providing me an exceptional PhD experience! Specifically, thank you to Dr. Beth McNeill for teaching me how to be an exceptional health educator and supporting me through this entire process, both in and out of the classroom. The support system I was a part of during my time at Texas A&M University has grown me personally and professionally in more ways than words can express.

Thank you my parents, Terry and Paula Szucs, and sister, Vanessa, for supporting me throughout this journey! I could not have done it without your encouragement and love (…even from 1500 miles away). Thank you to my partner, Zach, for grounding me during the crazy times and pushing me to chase my goals. I have to thank my friends, those near and far, for being my biggest fans and sending love, prayers, inspiration, and snacks along the way. And lastly, a special thanks for my lulu crew, who helped me sweat through the final stages of this research – thank you!

CONTRIBUTORS AND FUNDING SOURCES

Contributors

This work was supervised by a dissertation committee consisting of chair, Professor Kelly L. Wilson, and committee members Professors Adam Barry, Patricia Goodson, and Yorghos Apostolopoulos of the Department of Health and Kinesiology and Professor Kenneth McLeroy of the Department of Health Promotion and Community Health Sciences at Texas A&M Health Science Center. All work for the dissertation was completed by the student, in collaboration with Amie Carreon and Christi Hays of the Department of Health and Kinesiology, and Emily Martin of the Center for Community Health Development at Texas A&M Health Science Center.

Funding Sources

Graduate study was supported by a fellowship from Texas A&M University and a dissertation research fellowship from the College of Education and Human Development 2016-2017 Strategic Research Award.

NOMENCLATURE

CDC	Centers for Disease Control and Prevention
CFIR	Consolidated Framework for Implementation Research
EBIs	Evidence-based Interventions
OAH	Office of Adolescent Health
TPP	Teen Pregnancy Prevention
TPPPI	Teen Pregnancy Prevention Program Implementation

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CHAPTER I

INTRODUCTION

Rates of unplanned pregnancy and birth among teens remain highest in the United States among all other industrialized nations (Hamilton, Martin, Osterman, & Curtin, 2014). Females who experience a teen birth (i.e., before age 18) are less likely to finish high school, with approximately 38% reporting receiving a high school diploma. Teen mothers are more likely to enroll and use public assistance programs, demonstrate poorer behavioral health outcomes, and are at increased risk for repeat births when compared to peers who are older at age of first birth (Hoffman & Maynard, 2008; National Campaign to Prevent Teen and Unplanned Pregnancy, 2016). Childbearing during adolescence is associated with increased risk of experiencing intimate partner violence, sexual abuse, and birth control sabotage (Center for Impact Research, 2000; National Campaign to Prevent Teen and Unplanned Pregnancy, 2016).

While the United States teen birth rate is at a record low, decreasing by over 50% between 1991 and 2013 (Hamilton, Martin, Osterman, & Curtin, 2014), continued work to sustain this downward trend is needed. In 2013, almost 275,000 babies were born to teen girls between the ages of 15 and 19 and despite recent successes, disparities among age, race/ethnicity, and geographic location disproportionately affect adolescents in different groups. In 2012, births to teens between 15 and 19 years old represented 46.3% Hispanic mothers, 43.9% Black mothers, 34.9% Native American mothers, 20.5% Non-Hispanic White mothers, and 9.7% Asian or Pacific Island mothers. Moreover, U.S. teen birth rates vary by geographic region with the lowest rates in the Northwest (13.1%) and

highest rates among Southern and Southwest states (47.5%) (Martin et al., 2013). Teens in rural communities are more likely to experience pregnancy than peers living in urban and city regions with birth rates of 43 per 1,000 females in rural areas versus 36 per 1,000 in medium metropolitan regions (Ng & Kaye, 2013).

Over the past decade, targeted efforts to understand and enhance the evidence base in teen pregnancy prevention have been achieved. Seminal work by Kirby (2007) titled *Emerging Answers: Research Findings on Program to Reduce Teen Pregnancy an Sexuality Transmitted Diseases* presented a synthesis of research findings which served to inform research and practice on 'work works' in preventing unplanned pregnancy and sexually transmitted diseases. The *Emerging Answers* report provided critical evidence about salient factors influencing sexual risk-taking; described programs and approaches that had reduced teen sexual risk-taking, teen pregnancy or STD; expanded the list of programs with strong evidence of impact; described the characteristics of effective sex and STD/HIV education programs contributing to their success; and described promising strategies for organizations and communities that want to select, adapt, design or implement prevention programs for their own teens (Kirby, 2007, p. 11).

Continuing the forward momentum created by Kirby (2007) in 2010, the Department of Health and Human Services (DHHS) sponsored an independent, systematic review process of teen pregnancy prevention literature and programs which demonstrated effectiveness at reducing teen pregnancy and/or sexual risk behaviors associated with teen pregnancy (Goesling, Lugo-Gil, Lee, Novak, & Mathematica Policy Research, 2015; DHHS, 2014). Program models included a variety of approaches—

abstinence, sexual health education, youth development, and programs for clinical settings and specific populations— all of which demonstrated positive results in at least one rigorous evaluation. Thirty-five program models met the review criteria based on the following:

> "The program must show evidence of at least one favorable, statistically significant program impact on at least one sexual behavior or reproductive health outcome of interest (sexual activity, contraceptive use, STIs, pregnancy, or birth); and the program's research studies must meet established criteria for the quality and execution of their research designs" (Goesling, Lugo-Gil, Lee, Novak, & Mathematica Policy Research, 2015, p. 1).

The evidence base within teen pregnancy prevention is able to grow and expand due to the strong foundation contributed by Kirby (2007), Goesling et al. (2015) and others within the field. Integrating characteristics of effective programs (e.g., medically-accurate content, trained facilitators), conducting tailored assessment to measure population needs, using theoretical and/or logic models to develop programs and interventions, focusing on information necessary for behavior change, and incorporating interdisciplinary behavioral/social science research have improve the field's understanding of teen sexual health and pregnancy, while also improved program content and implementation strategies aimed at decreasing adolescent birth rates and sexual risk (Centers for Disease Control and Prevention [CDC], 2016; Kirby, 2007).

One of the largest contributions to promoting the TPP program evidence base is led by the Office of Adolescent Health's Teen Pregnancy Prevention Program. In 2010, OAH established an initiative dedicated to improving the health and wellbeing of adolescents, funding implementation and evaluation of 23 evidence-based program models (Tier I) and 19 new innovative (Tier II) TPP program approaches (OAH, 2016a; 2016b). As part of the awarded TPP funding to Tier I and Tier II programs, the OAH required grantees to provide results from both an impact study (i.e., effects of TPP program on adolescents' behavior and cognition) and an implementation study (i.e., report of program fidelity, dosage, and realistic delivery) at the conclusion of the project period (Farb & Margolis, 2016). In 2015, OAH awarded a second cohort of TPP grantees to investigate programs which reach and deliver services to vulnerable adolescent populations using innovative thinking and approaches to programming (OAH, 2016b). The environment of teen pregnancy prevention is gaining momentum in establishing a strong empirical base through continued support from the OAH TPP program and others, which allow researchers and practitioners to study and deliver preventive programs to youth and communities that show unique needs and risks associated with unplanned pregnancy (Margolis & Roper, 2014).

Data from theoretical and empirical investigations describing teen pregnancy prevention program effectiveness are present, the implementation processes and practices among evidence-based programs remains an under-reported area of research by researchers and practitioners (Huberman & Advocates for Youth, 2004; Kirby, 2007; Santelli, 2008). Implementation represents a large portion of the generalized program

planning process (McKenzie, 2009) and requires more in-depth investigation and critique to understand the impacts application practices have on program participants and outcomes in teen pregnancy prevention.

Implementing teen pregnancy prevention programs, such as It's Your Game (IYG) or Reducing the Risk (RtR), is a complex process involving multiple people, factors, and resources working in synergy. The implementation process includes phases and distinct steps, which allow stakeholders and systems to mobilize action (Brownson, Kreuter, Arrington, & True, 2006; Fixsen et al., 2005; Metz & Albers, 2014), while also considering population-specific needs, resource constraints, organizational capacity and support, as potential barriers and/or facilitators to effective program delivery (Ott, Rouse, Resseguie, Smith, & Woodcox, 2011). Implementation science challenges researchers and practitioners to analyze the dynamic factors influencing implementation as a mechanism to improve health promotion interventions (Fixsen, Naoom, Blase, Friedman, & Wallace, 2005; Metz & Albers, 2014).

Evidence discussing implementation practices in teen pregnancy prevention are present in several new peer-reviewed outlets within the field. In 2014, a special edition in The Journal of Adolescent Health [JAH] (Farb, Margolis, Rice, & Jensen, 2014) titled *Implementing Evidence-Based Teen Pregnancy Prevention Programs: Legislation to Practice*, discussed implementation challenges and lessons learned from the perspectives of the 2010 OAH teen pregnancy prevention replication and innovation program grantees. Research cited in JAH's special edition point to why implementation is a critical component to program evaluation and outcomes, and expresses the diversity and

complexity of implementing evidence-based efforts in community contexts (Margolis & Roper, 2014). In 2016 the American Journal of Public Health [AJPH] (Morabia, 2016) published a special edition titled *Building Evidence to Prevent Adolescent Pregnancy,* which compiled 41 program evaluations assessing the effectiveness of replicated and innovative TPP programs.

In the spring of 2017, The Journal of Adolescent Health (Farb, Margolis, Rice, & Jensen, 2017) released a special supplement edition titled, *Implementing Community-Wide Teen Pregnancy Prevention Initiatives,* which discussed results from a National Demonstration Project - Integrating Services, Programs, and Strategies through Community-Wide Initiatives to decrease rates of adolescent unplanned pregnancy. Research cited in the 2017 JAH's special edition discussed successes and challenges faced during program implementation and evaluation to expand the knowledge base for adolescent pregnancy prevention research.

To date, the dominant research approaches in teen pregnancy prevention are traditional strategies used to understand design, implementation, and evaluation of program effects (Kirby, 2007). The traditional epistemological approach—focused on linear thinking—dissects multilevel factors (e.g., knowledge/attitudes, behavioral skills, resource availability) influencing adolescent sexual decision-making in order to design programs which decrease negative sexual behaviors and outcomes. Deconstructing factors into small chunks (Carey et al., 2015; Luke & Stamatakis, 2012), may not be the most ineffective way to address the complex interplay between intrapersonal, interpersonal, community, and policy influences on adolescents' sexuality (Tolman,

Striepe, & Harmon, 2003). Furthermore, issues of appropriate research design, sampling technique, statistical analysis aimed at implementation, and evaluation remain rooted in traditional, reductionist action (Kirby, 2007; Tolman, Striepe, & Harmon, 2003). Only investigating factors influence teen pregnancy and sexual risk-taking limit researchers' and practitioners' abilities to understand and serve adolescent's dynamic needs.

Systems science includes a class of analytic approaches which seeks to uncover the behaviors of complex systems, encourages a rethinking of 'how pieces of the whole' interact with one another, and examines the dynamic relationships between elements and levels in a system (Atwood, Pedler, Pritchard, & Wilkinson, 2003; Hawe, Shiell, & Riley, 2009; Trochim, Cabrera, Milstein, Gallagher, & Leischow, 2006). Methodological approaches such as System Dynamics models—comprised of causal feedback structures and stock-and-flow accumulations— and Agent-Based Modeling provide opportunities to organize and simulate data about reality (Sterman, 2000). Research using systems-oriented approaches is critical for advancing mental models (i.e., personal understanding and thinking) about individual and community-level health practices and outcomes (Peters, 2014; Mabry, Olster, Morgan, & Abrams, 2008).

Evidence describing the shift between strictly applying traditional research approaches and integrating systems-thinking strategies to understand teen pregnancy prevention is emerging within the peer-reviewed literature. Theoretical contributions from Wandersman et al. (2008) posit an Interactive Systems Framework (ISF) for Dissemination and Implementation aimed at bridging the gap between prevention research and practice. The ISF model has been applied to CDC HIV/AIDS preventative

initiatives (Collins et al., 2012) and community-readiness levels to adopt school-based prevention programs (Flaspohler, Meehan, Maras, & Keller, 2012). Research from Lewis et al. (2012) and Lesesne et al. (2008) reported the ISF as helpful to strengthen arguments for science-based (i.e., evidence-based) teen pregnancy prevention programs. Authors argue supportive system partnerships are grossly under-researched and posit mechanisms between the Synthesis and Translations Systems within ISF can improve TPP and STI/HIV programming. Scholars Orr & Evans (2011), contributed the first agent-based model (ABM)—a methodological approach from systems and complexity science (Sterman, 2000) — to understand the long-term diffusion of adolescent sexual initiation patterns. This innovative research applied ABM to illustrate the diffusion of sexual initiation behaviors among adolescents and identified artificial intervention points which functioned to produce measurable effects on system behavior (Orr & Evans, 2011).

Recognizing the success TPP research and program efforts have made on adolescents' sexual behaviors, unplanned pregnancy and birth rates is indisputable. A decreasing national teen birth rate, supported implementation of evidence-based programs, and improved services for minority and vulnerable adolescents mark significant public health contributions to the battle against unplanned teen pregnancy (CDC, 2016). Using traditional and systems-thinking approaches to understand TPP program implementation practices can challenge individuals' and communities' mental models and address the nonlinear, complex nature of adolescence. Outcomes from understanding TPP program design, implementation, and evaluation as a complex

system can propel efforts already underway to improve sexual health outcomes and prevent teen unplanned pregnancy.

The long-term goal of this dissertation, therefore, is to: (1) provide intervention strategies which enhance program implementation in teen pregnancy prevention, and (2) expand the use of systems thinking in health behavior research. Therefore, we hypothesize this project will identify current theoretical and applied implementation practices among replicated and innovative teen pregnancy prevention programs, and will help provide evidence from a system dynamics case example to understand program implementation factors. This project's results will have a positive impact on the field by filling critical gaps in knowledge and literature surrounding implementation and evaluation practices of teen pregnancy prevention, and integrating systems thinking to enhance traditional approaches to public health research and practice. Consequently, short term applications of this project's results may include new insight into the theoretical assumptions relevant to program implementation, provide a synthesis of evidence-based implementation practices within the TPP program field, as well as showcase system thinking and approaches as beneficial for understanding factors and feedbacks related to implementation.

This dissertation is innovative because it contributes to the field of implementation science and systems thinking within public health by evaluating program implementation practices from a federally funded teen pregnancy prevention initiative seeking to improve the sexual health and wellbeing of adolescents in the United States. Findings add valuable evidence and expand the repertoire of research

targeting the implementation process of teen pregnancy prevention programs. This project provides support for existing theoretical understandings and presents a platform for future theory building and testing in implementation science and teen pregnancy prevention. To date, the mainstream research on teen pregnancy prevention has centered on program evaluation to determine effectiveness of evidence-based and new innovative programs which decrease sexual risk-taking and unplanned teen pregnancy among. Traditional approaches to testing programs rely heavily on linear thinking and models to shape the research questions, design, analysis, and results interpretation (Kirby, 2007). While linear models have contributed to success in building the evidence base in teen pregnancy, they cannot identify or capture the dynamic feedback relationships between multi-level causal factors (i.e., intra-, inter-, organization, and policy) which influence program implementation behavior over time (Luke & Stamatakis, 2012; Sterman, 2000). Using systems thinking is a critical step in moving toward better understanding of feedback and dominant forces impacting program implementation in teen pregnancy. Therefore, the aim of this dissertation is to investigate the theoretical and applied implementation practices among federally funded teen pregnancy prevention programs in the United States by integrating traditional and systems thinking approaches.

This dissertation project is written and defended in the departmental approved journal article (i.e., manuscript) format. This format will allow the researcher to write journal articles based on the data collected throughout phase I, phase II, and phase III. Each article is self-contained; however, the articles together represent all elements that would comprise the traditional five-chapter dissertation format.

Due to the journal article format adopted for this dissertation, the content and flow of the chapters vary from that of the book-chapter format. Three manuscripts will make-up the body of this dissertation and the following is a brief description of the dissertation contents based on a journal article format, specific to the current project:

- Chapter I: General overview and rationale for the dissertation project
- Chapter II: A scoping review addressing the current body of literature regarding teen pregnancy prevention program implementation practices and measures. The review will highlight the theoretical and applied practices associated with implementing programs to reduce unplanned teen pregnancy.. This chapter will represent the first journal article.
- Chapter III: Report findings from a cross-case analysis exploring implementation practices and measures among the 2010-2014 OAH TPP program case reports. This chapter will represent the second journal article.
- Chapter IV: Present a qualitative system dynamics causal loop diagram (CLD) exploring the feedback mechanisms and system structure of implementation practices and measures among 2010-2014 OAH TPP programs. This chapter will represent the third article.
- Chapter V: Discuss overall project findings. Implications for health education, behavior, and promotion, as well as future research needs, will be assessed.

CHAPTER II

A SCOPING REVIEW TO EXPLORE TEEN PREGNANCY PREVENTION (TPP) PROGRAM IMPLEMENTATION EVIDENCE

Introduction

It is well documented in many disciplines that major gaps exist between what is considered 'effective practice' (i.e., theory and research) and what happens in real application (i.e., policy and practice) (Fixsen et al., 2005). Understanding the processes and practices associated with implementing programs is an important step in connecting scientific inquiry and practice-based applications to improve services for adolescents (Lesene, Lewis, White, Green, & Wandersman, 2008; Philiber & Nolte, 2008; Durlack & DuPre, 2008; Fixsen et al., 2005).

According to a comprehensive review of almost 2,000 implementation science citations and studies[1], "Implementation is the specific set of activities designed to put into practice an activity or program of known dimensions" (Fixsen et al., 2005, p. 5). Implementation practices are purposeful and must be described in adequate detail so an individual observer can detect the strength and content of activities delivered. Durlack & DuPre (2008) describe implementation as the systematic study and uptake of research to practice principles to improve health, while Philiber and Nolte (2008) define

[1] Fixsen et al. (2005) synthesized implementation studies from programs in a variety of domains including agriculture, business, child welfare, engineering, health, juvenile justice, manufacturing, medicine, mental health, burst, and social sciences (p. vi). Three hundred and seventy-seven cross-sectional, experimental analysis, and case-study investigations of implementation factors met the inclusion criteria for the final review.

implementation as the practice for understanding diffusion of innovations, ideas or practices perceived to be new, which lead to adoption and use over time. Despite varying definitions, core essential outcomes associated with program implementation include changes in adult behavior who work directly with the implementing organization, sustainable changes in the organizational structure and culture — both formal and informal — which supports adult's behavior change, and changes to the relationships among program participants (i.e., adolescents), school and/or community stakeholders, and broader network partners (Fixsen et al., 2005).

Substantial investments have been made to support conducting and disseminating research that identifies what works in adolescent sexual health, specifically teen pregnancy prevention (TPP). In 2007, Kirby published a review of TPP titled *Emerging Answers: Research Findings on Program to Reduce Teen Pregnancy and Sexuality Transmitted Diseases* that presented a synthesis of research findings proven as effective strategies for preventing unplanned pregnancy and sexually transmitted diseases among adolescents. In 2010, the Department of Health and Human Services (DHHS) sponsored an independent, systematic review process of teen pregnancy prevention literature and programs to identify those with effectiveness at reducing teen pregnancy and/or sexual risk behaviors associated with teen pregnancy (Goesling, Lugo-Gil, Lee, Novak, & Mathematica Policy Research, 2015; DHHS, 2014). Program models, including a variety of approaches—abstinence-only, sexual health education, youth development, and programs for clinical settings and specific populations—demonstrated positive changes in adolescents' sexual behavioral and/or cognitive sexual health knowledge in at least

one rigorous evaluation (Goesling, Lugo-Gil, Lee, Novak, & Mathematica Policy Research, 2015; DHHS, 2014). As the evidence base in teen pregnancy prevention continues to expand, closing the gap between adolescent research and community-based practice can facilitate improvements in intrapersonal, interpersonal, and organizational health outcomes (Philiber & Nolte, 2008). The fields of adolescent sexual health and teen pregnancy prevention are committed to helping decrease unplanned pregnancy and its associated negative outcomes (National Campaign to Prevent Teen Pregnancy, 2016), through strategic support and funding to implement evidence-based programs in school and community settings.

Funding mechanisms and programs supported by the Office of Adolescent Health (OAH), Centers for Disease Control & Prevention (CDC), and Family and Youth Services Bureau (FYSB) aim to decrease teen unplanned pregnancy and sexually transmitted disease rates. In 2010 the Office of Adolescent Health (OAH) establish the *Teen Pregnancy Prevention Program* which allocated funding to support organizations and community-based groups in implementing rigorously evaluated evidence-based and/or innovative TPP programs (OAH, 2016a). The 2010 initiative, dedicated to improving the health and wellbeing of youth, funded implementation and evaluation of 23 evidence-based program models and 19 innovative TPP program approaches (OAH, 2016a). Similarly, in 2010 the Centers for Disease Control & Prevention (CDC) launched *The National Demonstration Project - Integrating Services, Programs, and Strategies through Community-Wide Initiatives* (referred to as the Community-Wide Initiatives) to decrease rates of unplanned pregnancy reported among adolescents

(Romero et al., 2017). The Family and Youth Services Bureau (FYSB) Adolescent Pregnancy Prevention Program (APP) provided funding to state, tribal and community efforts to promote abstinence and contraceptive education (Family and Youth Services Bureau, 2017). FYSB APP programs are required to provide medically accurate, culturally relevant, and age-appropriate content to adolescents enrolled in any of the grant-supported programs which include *State Personal Responsibility Education Program; Tribal Personal Responsibility Education Program; Personal Responsibility Education Program Competitive Grants under the Affordable Care Act; Personal Responsibility Education Innovative Strategies Program; Title V State Abstinence Education Grant Program;* and *Competitive Abstinence Education Grant Program* (Family & Youth Services Bureau, 2017).

Required by teen pregnancy prevention funding initiatives (i.e., OAH TPP Program, CDC Community-Wide Initiatives, and FYSB APP Program) was data collection and reporting of implementation measures and practices which took place during the program funding cycle. Documenting program implementation practices within schools, community-based organizations, and healthcare clinics can improve groups' understanding of program dynamics and opportunities to replicate. Funding agencies are increasing requiring implementation data be collected and reported to provide context for which program-level outcomes (e.g., changes in adolescent knowledge, attitude, skill) can be interpreted (Philiber & Nolte, 2008).

Adopting and implementing new programs and practices takes time within a community context. As evident with the first cohort of OAH TPP programs,

implementation data are just now available, in 2016, which allow for in-depth study of the processes, conditions, and elements which facilitated and/or blocked full program implementation and fidelity. Seeking to understand how implementation is contextualized and carried out within the community setting, the federal funding initiatives required collecting, reporting, and disseminating implementation elements through their funding agreements (OAH, 2016a; 2016b). Implementation elements such as levels of community readiness, adherence to program content, and quality of relationship between organizational staff, facilitators, and participants served as measures of implementation success (OAH, 2016a; 2016b).

Evaluating the historical and contemporary literature surrounding teen pregnancy prevention programs, one sees a focus on program-level outcomes (Advocates for Youth, 2003; CDC, 2007; Suellentrop, 2011) with limited focus on implementation findings. Analyzing program effects and changes in participants' intentions, attitudes, and behaviors pre- and post-intervention remains the dominant focus within the peer-reviewed and professional literature (Kirby, 2007). Albeit the contributions from TPP program outcome research to the field, questions such as "*What happened during the implementation phases of the program that might have contributed to the outcomes reported*?" and "*Were there differences in implementation which may have shaped program outcomes?"* remain unreported by current TPP researchers.

In attempts to answer these questions and others, researchers and practitioners must consider implementation data as critical information needed to interpret TPP program outcome results. The aim of this paper is to evaluate studies published in the

current peer-reviewed literature and uncover components which contributed to teen pregnancy prevention program implementation measures and outcomes. We conducted a scoping literature review (Arksey & O'Malley, 2005) which allowed us to account for the breadth and depth of the current literature to capture theoretical, procedural, and empirical evidence discussing teen pregnancy prevention implementation. The research question guiding this review was *"What is the current state of literature investigating theoretical, procedural, or empirical evidence in TPP program implementation practices*?"

Methods

The aim of this study was to identify theoretical, procedural, and empirical evidence describing the implementation practices among teen pregnancy prevention programs. To do this, we conducted a scoping review aimed at summarizing a range of research within the TPP literature. The difference between a scoping and systematic review is that a scoping review summarizes a range of research to assess the *breadth and depth of a field*, whereas a systematic review also assesses the *quality of studies* (Arksey & O'Malley, 2005).

Inclusion and Exclusion Criteria

For inclusion in this review, articles had to meet the following criteria: (1) written in English and published in peer-reviewed journal in the United States, or published as a conference white paper, and/or dissertation; (2) discuss *theoretical support* for TPP program implementation practices; (3) describe *procedural steps* employed during TPP program implementation; (4) *empirically* examine implementation

practices and measures among teen pregnancy prevention programs; and (5) be published between 1990 and 2017. Articles which did not meet the inclusion criteria above were subsequently excluded from this review. Additionally, articles which we were unable to retrieve (n = 1) because of incorrect cataloging in the database were excluded from the investigation.

Retrieval

We surveyed the peer-reviewed literature describing implementation practices among TPP programs. See Figure 1 for the PRISMA flow diagram of reviewed studies (Moher, Liberati, Tetzlaff, Altman, & The PRISMA Group, 2009). The search was conducted using five electronic databases to compile evidence supporting TPP program implementation practices: PsycInfo, Medline, Academic Search, ERIC, and CINAHL. The main search terms used were: "implementation science", "teen pregnancy prevention program implementation", "adolescent program implementation", "teen pregnancy prevention dissemination" and "teen pregnancy prevention program evaluation". All relevant reference lists were reviewed to identify any additional related articles.

In total, 763 articles published between 1990 and 2017 were identified through the database search. Of the original 765, 352 were included for abstract review based on title. If articles did not investigate theoretical, procedural, or empirical evidence of TPP program implementation, they were removed. Two hundred and ninety-three articles were excluded after abstract examination because (a) the focus of the study was not on TPP program implementation, or (b) the study described TPP program outcome-leve results but did not discuss implementation-level practices and/or results. Overall, full texts of 59 articles were reviewed. Thirty-six articles were then excluded from the final sample because implementation measures and/or results were not the focus on the paper, or because the study solely reported program outcome results (e.g., changes in sexual activity among adolescents), resulting in 23 full text articles extracted and included in the final sample. Four trained researchers independently reviewed the 23 full text articles (Figure 1). The final 23 articles were extracted into an integrative methods framework as suggested by Whittmore & Knalf (2005) (see Appendix A for the full article review matrix).

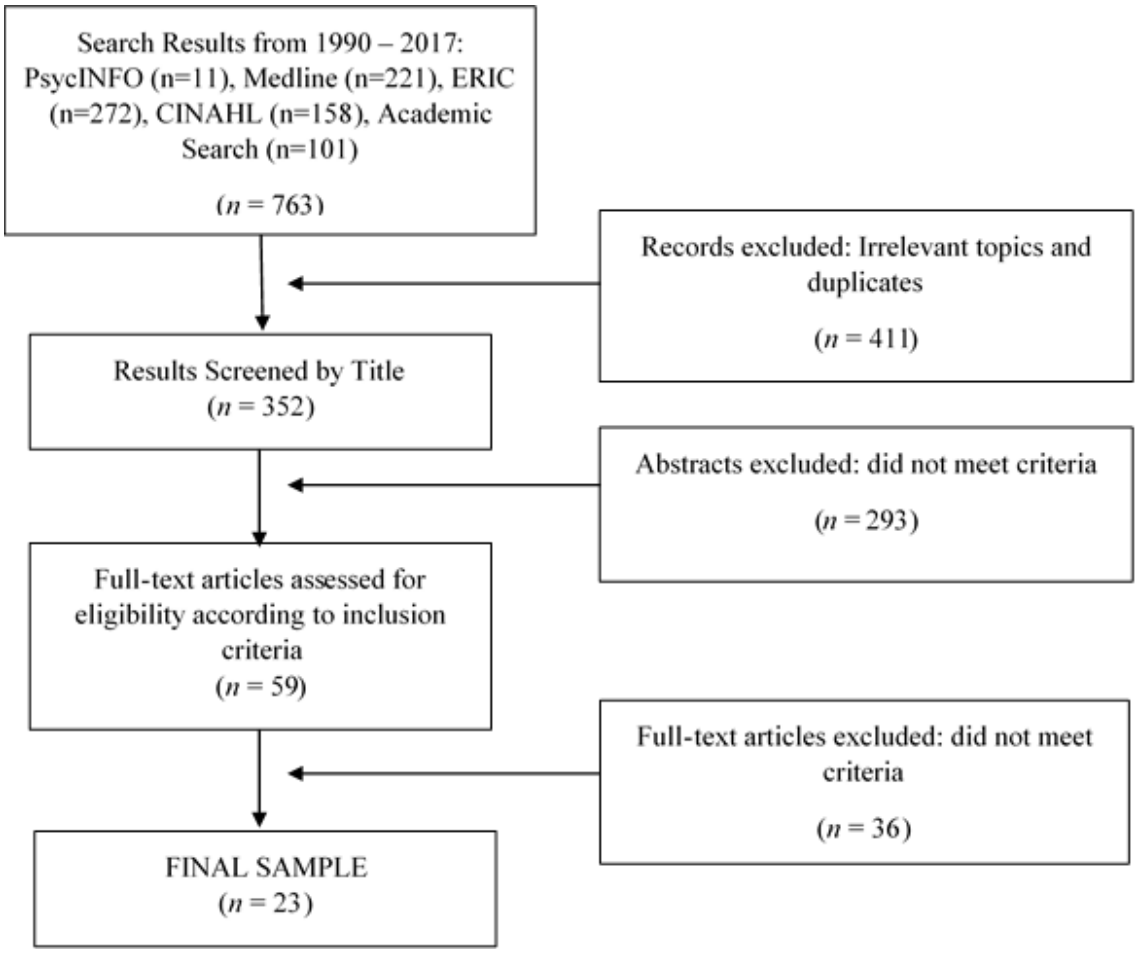

Figure 1. PRISMA Flow Diagram of Studies Investigating TPP Implementation Practice

Findings

Sample Characteristics and Study Designs

Sample Characteristics. All studies included in this review targeted implementation of teen pregnancy prevention programs. Twelve studies (52%) discussed program implementation in the school setting (i.e., middle and/or high school) (Kelsey et al., 2016a; Calise et al., 2016; Gelfond, Dierschke, & Plastino, 2016; Potter, Coyle, Glassman, Kershner, & Prince, 2016; Kelsey et al., 2016b; Abe, Barker, Chan, & Eucogco, 2016; Gilmore et al., 2015; Workman, Flynn, Kension, & Prince, 2015; Demby et al., 2014; Cronin, Heflin, & Price, 2014; LaChausse, Clark, & Chapple, 2014; Sharpio, & Kisker, 2012; Mueller et al., 2009), six studies (26%) described program implementation in a community setting (Bull et al., 2016; Robinson, Seibold-Simpson, Crean, & Spruille-White, 2014; Asheer, Berger, Meckstroth, Kisker. & Keating, 2014; Lesene, Lewis, White, Green, & Wandersman, 2008; Lesser et al., 2005), and five studies (22%) reported programs implemented in the healthcare clinic setting (Mueller et al., 2017; Walker, Inoa, & Coppola, 2016; Plastino et al., 2017; Romero et al., 2017; Tevendale et al., 2017).

Sixty-one percent (n=14) of the studies reported implementation practices of curriculum-based TPP programs from the DHHS evidence-based list (Cronin, Heflin, & Price, 2014; Kelsey et al., 2016a; Calise et al., 2016; Gelfond, Dierschke, & Plastino, 2016; Potter, Coyle, Glassman, Kershner, & Prince, 2016; Kelsey et al., 2016b; Abe, Barker, Chan, & Eucogco, 2016; Gilmore et al., 2015; Workman, Flynn, Kension, & Prince, 2015; Demby et al., 2014; LaChausse, Clark, & Chapple, 2014; Robinson,

Seibold-Simpson, Crean, & Spruille-White, 2014; Sharpio, & Kisker, 2012; Mueller et al., 2009; Goesling, Lugo-Gil, Lee, Novak, & Mathematica Policy Research, 2015; DHHS, 2014). Another five studies (22%) discussed implementation results from the 2010 Centers for Disease Control & Prevention Community-Wide Initiative to prevent teen pregnancy (Romero et al., 2017) using healthcare providers in clinic settings (Mueller et al., 2017; Walker, Inoa, & Coppola, 2016; Plastino et al., 2017; Romero et al., 2017; Tevendale, Fuller, House, Dee, & Koumans, 2017b). The remaining two implementation studies (9%) described program delivery of a unique Washington State Medicaid program which provided reproductive health services to women (Gilmore et al., 2015) and Family Life and Sexuality Module from the electronic *HealthTeacher* curriculum for high school students (Sharpio, & Kisker, 2012). Zero studies discussed implementation-level results from the FYSB Adolescent Pregnancy Prevention Program grantee evaluations.

Study Designs. The study designs associated with the articles included in this review were divided into two groups. Almost half of the studies, 48% (n=11), discussed implementation data abstracted from randomized controlled trials, while the remaining articles, 52% (n=12), discussed findings about TPP program implementation from qualitative case study investigations.

Theoretical, Procedural, and Empirical Implementation Evidence

Theoretical Implementation Evidence. Of the studies included in the scoping review, three articles discussed a theoretical framework which guided TPP program implementation processes and practices. Several studies in the scoping included

discussion on theoretical justifications used to develop the TPP program content and curriculum (; however, this results presented herein discuss only theoretical frameworks were applied to understand the TPP program implementation processes among school, community, and/or healthcare clinic settings.

Mueller et al. (2017) and Lesene, Lewis, White, Green, & Wandersman (2008) applied the Interactive Systems Framework (ISF) for Dissemination and Implementation (Wandersman et al., 2008) theoretical model, from the field of Community Psychology, to understand improved stakeholder and community mobilization towards implementing teen pregnancy prevention initiatives using healthcare clinics and providers. Drawing from three unique systems: the Prevention Synthesis and Translation, Prevention Support, and Prevention Delivery, community-based organizations strengthened their capacity to implement TPP programing and improved adolescent reproductive health outcomes (i.e., access and use of contraceptive methods) (Mueller et al., 2017). Findings across each ISF level demonstrated improvements in quality and amount of technical assistance for programs implementing TPP programs with specific outcomes including implementation of evidence-based interventions (EBIs) with high fidelity (representing synthesis and translation system), tailored technical assistance for each implementation site (representing the prevention support system), and on-going technical assistance throughout the duration of the implementation cycle (representing the prevention delivery).

A second study conducted by Walker and colleagues (2014) applied Rogers' Diffusion of Innovation (DOI) Theory (1995) from the field of Communication Studies,

to understand how innovation and practice are adopted in public health. Diffusion properties, specifically levels of Trialability, describe when adopters are able to test the innovation before full adoption takes place (Walker, Mwaria, Coppola, & Chen, 2014; Rogers, 1995). Trialability of an innovation may facilitate a critical 'test period' in which program implementers can identify and potentially mitigate barriers before full-scale implementation (Walker, Mwaria, Coppola, & Chen, 2014; Rogers, 1995). Rogers (1995) argues the pre-implementation phase is needed to test evidence-based interventions (EBIs) in new settings with different populations and facilitates purposeful and strategic planning. In the context of TPP program implementation, focusing efforts on the pre-implementation and Trialability phase allowed TPP program organizations to assess readiness and existing capacity to carry out program implementation (Walker, Mwaria, Coppola, & Chen, 2014). Furthermore, program coordinators reviewed and mastered program content, improved facilitator training, and made structural organizational changes before issues surfaced during full-scale implementation (Walker, Mwaria, Coppola, & Chen, 2014). Both theoretical applications among TPP program implementation in school/community and healthcare clinic settings illustrated theoretical assumptions about program needs, barriers, and resources across multi-site implementation partners.

Procedural Implementation Evidence. To understand procedures and practices associated with TPP program implementation, four studies (18%) met the inclusion criteria for the scoping review. Elements of implementation including staff/facilitator training, tailored technical assistance, implementation performance measures, and

fidelity monitoring tools were discussed. Plastino, Quinlan, Todd, & Tevendale (2017) described key elements to staff/facilitator training (i.e., recruiting and retaining invested people) and argued that thorough, detailed, and timely training for facilitators is needed in order to learn EBIs content and provide teach-back practice opportunities. Romero et al. (2017) reported extensive needs assessments are necessary to tailor technical assistance and support for programs. Engaging in ongoing dialogue with stakeholders, community-based organization, and staff/facilitators helps to align required implementation practices with appropriate supports and training from intervention developers or funding agencies.

Another critical element to the implementation process is measurement tools used to quantify outcomes. Two studies authored by Tevendale et al. (2017a) and Cronin, Heflin, & Price (2014), reported on implementation tools (i.e., fidelity monitoring logs) and performance measures used to determine program fidelity, adherence, and organization's quality of services provided by partners. Using fidelity monitoring score cards and/or documents is a systematic way to evaluate implementation practices (Cronin, Heflin, & Price, 2014; Fixsen et al., 2005) but an alignment between items on the scorecard and current organizational needs and resources must be present (Tevendale et al., 2017a). Before program implementation begins, organizations must assess current needs and resources as a mechanism to determine what performance measures and tools are feasible and realistic for collection (Lesene, Lewis, White, Green, & Wandersman, 2008). Funding agencies supervising implementation often require performance measure reporting using facilitator observations, electronic attendance

records, or fidelity logs without prior consideration of whether the implementing organization can accommodate and comply with report requests (Cronin, Heflin, & Price, 2014).

Empirical Implementation Evidence. The majority of studies (n=16, 73%) in the review discussed empirical evidence from TPP program implementation. The following variables were evaluated in this sample of peer-reviewed literature: TPP program; implementation measures; barriers to implementation; and recommendations for future implementation practice.

TPP program. One study in the review discussed implementation of the Teen Outreach Program (TOP) in New Orleans, Louisiana and Rochester, New York (Robinson, Kaufman, & Cahill, 2016), while two additional studies reported implementation findings from a revised and/or adapted version of the Teen Outreach Program (TOP): Teen Outreach Program (TOP) + text message program called Youth All Engaged! (YAE!) in Denver, Colorado (Bull et al., 2016) and Adult Identity Mentoring (Project AIM) & Teen Outreach Program (TOP) in Los Angeles County, California and Columbus, Ohio (Asheer, Berger, Meckstroth, Kisker, & Keating, 2014). Two studies evaluated It's Your Game: Keep it Real (IYG) South Carolina (Potter, Coyle, Glassman, Kershner, & Prince, 2016; Workman, Flynn, Kension, & Prince, 2015), while two other studies reviewed implementation of ¡Cuidate!, the culturally responsive teen pregnancy prevention program in Denver, Colorado (Muller et al., 2009) and communities in California, Arizona, and Massachusetts (Kelsey et al., 2016b). The remaining studies (n=9) each represented a different TPP program and discussed

implementation findings from Be Proud! Be Responsible & Respeto/Proteger (Lesser et al., 2005), Family Life and Sexuality Module from the HealthTeacher (Sharpio, & Kisker, 2012), Positive Prevention PLUS Sexual Health Education (LaChausse, Clark, & Chapple, 2014), Becoming a Responsible Teen (BART) (Demby et al., 2014), Take Charge! Program (Gilmore et al., 2015), Pono Choices (Abe, Barker, Chan, & Eucogco, 2016), Need to Know (N2K) (Gelfond, Dierschke, Lowe, & Plastino, 2016), Nu-Culture (Calise et al., 2016), and Reducing the Risk (Kelsey et al., 2016a), respectively.

Implementation measurement tools. A standard set of implementation measurement tools were described among the empirical studies (n=16) in the review. The measurement tools, while varied across program and implementation site, should align to core TPP program expectations (Gelfond, Dierschke, Lowe, & Plastino, 2016). Session fidelity logs (Bull et al., 2016; Kelsey et al., 2016a; 2016b; Gelfond, Dierschke, Lowe, & Plastino, 2016; Potter et al., 2016; Abe, Barker, Chan, & Eucogco, 2016; Asheer, Berger, Meckstroth, Kisker, & Keating, 2014; LaChausse, Clark, & Chapple, 2014; Sharpio, & Kisker, 2012) and Facilitator (i.e., teacher) Observations (Kelsey et al., 2016a; 2016b; Gelfond, Dierschke, Lowe, & Plastino, 2016; Potter et al., 2016; Robinson, Kaufman, & Cahill, 2016; Abe, Barker, Chan, & Eucogco, 2016; Asheer, Berger, Meckstroth, Kisker, & Keating, 2014; LaChausse, Clark, & Chapple, 2014) were central measurement tools to assess implementation frequency and quality.

Attendance, a measure of program dosage (OAH, 2016b; Fixsen et al., 2005), was recorded as a data point within the session fidelity logging system and recorded after each session. Program facilitators also completed self-report questionnaires

following program sessions (Robinson, Seibold, Simpson, Crean, & Spruille-White, 2016) and participated in key informant interviews and focus groups throughout the implementation period to provide ongoing feedback about barriers to implementing program content (Robinson, Kaufman, & Cahill, 2016; Asheer, Berger, Meckstroth, Kisker, & Keating, 2014; Gilmore et al., 2015; Workman, Flynn, Kenison, & Prince, 2015; LaChausse, Clark, & Chapple, 2014; Sharpio, & Kisker, 2012; Lesser et al., 2005). Technical assistance via in-person site visits and regular conference call updates was an effective mechanisms for reporting implementation results (Potter et al., 2016; Asheer, Berger, Meckstroth, Kisker, & Keating, 2014; Demby et al., 2014; Mueller et al., 2009; Lesser et al., 2005).

Barriers to implementation. Several studies described barriers which limited full implementation throughout the program period. First, low attendance rates and poor retention of participants was credited to competition from other activities (i.e., after-school programs, athletics) in three studies (Bull et al., 2016; Robinson, Kaufman, & Cahill, 2016; Asheer, Berger, Meckstroth, Kisker, & Keating, 2014). In one study describing implementation of the Teen Outreach Program (TOP) New Orleans, LA and Rochester, New York, parents were cited as a key barrier to why youth were not retained in the program, noting that disciplinary action (i.e., grounding) by a parent restricted adolescent's participation (Robinson, Kaufman, & Cahill, 2016). Second, barriers such as program transportation and unexpected weather delays limited implementation in five studies (Robinson, Kaufman, & Cahill, 2016; Asheer, Berger, Meckstroth, Kisker, & Keating, 2014; Demby et al., 2014; Lesser et al., 2005). Restrictive room and program

facility policies also tampered with full implementation (Demby et al., 2014), while administrative and academic scheduling conflicts presented challenges in two studies (Calise et al., 2016; Workman, Flynn, Kension, & Prince, 2015). Last, factors related to the program facilitator were described as barriers to implementation in several studies. Facilitator discomfort with TPP program content (Asheer, Berger, Meckstroth, Kisker, & Keating, 2014; LaChausse, Clark, & Chapple, 2014) added to difficulties with implementation in two studies. Moreover, facilitators implementing the Positive Prevention PLUS Sexual Health Education program described feeling under-prepared and undertrained to implement the TPP program with fidelity according to core components (Asheer, Berger, Meckstroth, Kisker, & Keating, 2014; LaChausse, Clark, & Chapple, 2014).

Recommendations for future implementation. Twelve studies (55%) discussed empirical implementation evidence and ways to improve future practice. We synthesized results into four priority areas—Community and Participant Needs Assessment, Relationship Building with Key Stakeholders, Interactive and Hands-on Training for Program Facilitators, and Tailored and On-going Technical Assistance—describing what community-based organizations, program developers, facilitators, and/or evaluators should consider to improve TPP program implementation.

Priority Area I. Community and Participant Needs Assessment. Prior to any implementation action, implementing partners much conduct a thorough and socio-culturally relevant assessment of the community and potential participants (Demby et al., 2014; Mueller et al., 2009; Lesser et al., 2005). For example, Gilmore and colleagues

(2015) argued the importance of assessing the needs and existing resources of the participating healthcare clinics before implementing the TPP program to determine what training materials would enhance staff knowledge and skills and subsequently participant use of long-acting reversible contraception (LARC).

Priority Area II. Relationship Building with key stakeholders, community organizations, and implementation partners. TPP program implementation is a process, one which requires time, energy, resources, and interpersonal connections to grow and sustain. Several studies in the review suggested building relationships and developing community partnerships as initial steps needed for successful implementation (Demby et al., 2014; Asheer, Berger, Meckstroth, Kisker, & Keating, 2014; LaChausse, Clark, & Chapple, 2014; Workman, Flynn, Kension, & Prince, 2015; Lesser et al., 2005) and reported time during the pre-implementation phases as needed to foster stakeholder buy-in and support. The relationships established at the beginning must remain strong throughout the program period and individuals in all parties must work to ensure open communication and expectations of respect and mutual understanding to maximize the program's success (Lesser et al., 2005).

Priority Area III. Interactive and Hands-on Training for Program Facilitators. Several studies in the review described the need for interactive and hands-on training procedures for staff and/or facilitators. Gilmore and colleagues (2015) reported that interaction with program content, the use of medically accurate training resources, and opportunities to shadow other professionals in the program setting would improve implementation adherence and fidelity over time. Moreover, LaChausse et al. (2014) and

Sharpio & Kisker (2012) detailed a sequenced two-day facilitator training protocol including face-to-face and online modules which began with scaffolding from program developers and moved to facilitator autonomy and practice. Such training protocol could decrease facilitators' feelings of discomfort and/or low self-efficacy and allow for context-specific learning within the program and community context (Asheer, Berger, Mechstroth, Kisker, & Keating, 2014).

Priority Area IV. Tailored and On-going Technical Assistance. Training and technical assistance for program implementers and/or community partners enhances the implementation practices and reporting measures over the duration of the program (Fixsen et al., 2005). Strategies such as tailoring the technical assistance and resources to program's staff and target population (Mueller et al., 2017), developing checks and balances for task completion (Demby et al., 2014), or actively involving stakeholders in implementation planning can lead to improvements in organizational structure and culture, facilitator self-efficacy and implementation fidelity (LaChausse, Clark, & Chapple, 2014). The technical assistance also becomes important when creating or adapting implementation measurement tools (Gelfond, Dierschke, Lowe, & Plastino, 2016). Congruency between core program components, implementation requirements (i.e., fidelity or dosage), and requested measurement data captures accurate implementation practices in TPP programs (Sharpio & Kisker, 2012).

In sum, three of the studies (13%) focused on theoretical foundations among TPP program implementation, four studies (17%) discussed procedural steps involved in the implementation process, and the majority of studies (n=16, 69%) reported

implementation findings for TPP programs across school, community, and healthcare settings in the United States. Results provide a scoping review of the breadth and depth of implementation-focused research conducted in the field of teen pregnancy prevention over the last two decades.

Discussion

In response to adolescent risky sexual health behavior and unplanned pregnancy trends in the United States (Guttmacher Institute, 2016; Ng & Kaye, 2013), schools and communities are committed to implementing evidence-based programs focused on developing knowledge and skills need to keep adolescents safe and avoid the negative consequences from sexual risk-taking (Kirby, 2007). The complex process of program implementation involves multi-level factors including adolescents, adults, organizations, and community resources to support fidelity and adherence to program objectives which lead to greater likelihood of program success (Philiber & Nolte, 2008). As more TPP programs are developed, implemented, and evaluated researchers and practitioners have valuable data describing the implementation practices which are employed across a variety of program and community settings. In order to answer the research question driving this review *"What is the state of the literature investigating theoretical, procedural, or empirical evidence for TPP program implementation practices*?" we conducted a scoping review of the teen pregnancy prevention program implementation literature and assessed theoretical, procedural, and empirical evidence which influenced program implementation.

Theoretical Applications to TPP Program Implementation

The key theoretical insight contributing to TPP program research and practice asserts current literature has a narrow focus on exploring and reporting implementation theories which can improve program, organization, and community capacities to deliver TPP programs efficaciously and with high fidelity. Only three studies in the review discussed how they applied a theoretical framework to develop or guide their TPP implementation practices (Mueller et al., 20217; Lesene, Lewis, White, Green, & Wandersman, 2008; Walker, Mwaria, Coppola, & Chen, 2014). Incorporating more comprehensive frameworks to guide implementation plans can help organizations improve their current and future implementation practices.

The Interactive Systems Framework (ISF) (Walker, Mwaria, Coppola, & Chen, 2014) and Rogers (1995) Diffusion of Innovation (DOI) Theory were presented as key theoretical frameworks used for understanding TPP program implementation in community and school-based settings. The ISF provided a three-system approach to maximizing EBIs research synthesis, technical assistance and support, and the delivering tailored technical assistance in meaningful, useful ways (Lesene et al., 2008). Trialability levels from Rogers (1995) DOI theory during the pre-implementation phase allowed organizations and implementation partners to identify and alleviate barriers which could have negatively impacted the TPP program (Walker, Mwaria, Coppola, & Chen, 2014). Organization pre-implementation strategies highlighted in the study's results support other research by Kraft et al. (2000) who discussed important elements to the 'pre-implementation' phases for implementing HIV/AID prevention programs which

included: identifying the need for an intervention considering availability information, acquiring information via interactions with peers, assessing the fit between intervention program and community members, and preparing the organization, staff, and resources.

Additional theoretical frameworks, such as Consolidated Framework for Implementation Research (CFIR) (Damschroder & Lowery, 2013) and Reach, Efficacy, Adoption, Implementation, and Maintenance (RE-AIM) (Glasgow, Vogt, & Boles, 1999), which deconstruct implementation components and conditions can complement the current state of TPP program literature. Damschroder and colleagues (2009) developed the CFIR which provides a comprehensive taxonomy of operationally defined constructs from multiple disciplinary fields (e.g., sociology, organizational, change, psychology) which are associated with effective implementation. Five primary domains: Intervention Source, Inner Setting, Outer Setting, Facilitator, and Implementation Process contain sub-constructs which enable systematic and comprehensive exploration of variables related to the phenomenon of implementation (Damschroder & Lowery, 2013). The CFIR has been applied to investigate implementation of care-based best practices for rural health settings (English et al., 2011); obesity management among Veteran Affairs (VA) hospital systems; and internationally to asses United Kingdom's therapists' opinions on implementing stroke rehabilitation interventions for patients (Connell et al., 2014).

The Reach, Efficacy, Adoption, Implementation, and Maintenance (RE-AIM) model proposed by Glasgow, Vogt, & Boles (1999) evaluates public health interventions using a systems-based and social-ecological framework. RE-AIM asserts the synergy

between the 5 dimensions can help decision-makers adopt or discontinue health promotion program implementation based on an intervention's overall health impact or influence within an organization's unit structure. The RE-AIM model has been applied to programs in chronic disease (Glasgow, McKay, Piettem & Reynolds, 2001), and obesity management among VA hospital settings (Kahwati, Lances, Jones, & Kinsinger, 2011). Continued research applying the ISF, DOI, CFIR, or RE-AIM models to understand adolescent sexual health programs and teen pregnancy prevention efforts can enhance program services, organizational capacity and implementation-level outcomes reported among professionals in the field (Gaglio, Shoup, & Glasgow, 2013).

Procedural Steps Involved in the Implementation Phase

Operationalizing the implementation process creates opportunities to replicate, adapt, and learn from challenges and successes experienced while implementing TPP programs in school and/or community settings. A critical theme evident throughout the review was a strong need for organization staff/facilitator training procedures. Plastino, Quinlan, Todd, & Tevendale (2017) argued a comprehensive needs assessment strategy should take place prior to program implementation to help craft training content and educational materials offered to facilitators. Fixsen et al. (2005) suggest effective training workshops should include presenting information (knowledge), providing demonstrations (live or taped) of the important aspect of the program, and allowing opportunities for behavioral rehearsal (role play) during all training sessions.

Documenting the technical assistance strategies used to support organizations who implement TPP programs is an important aspect to improving implementation

practice. Clear communication pathways (e.g., listservs, conference calling), assistance writing research briefs or report documents, providing on-going and booster training sessions for staff/facilitators, and managing databases with supporting documents and information can improve procedures and implementation practices among TPP implementing organizations (Fixsen et al., 2005). Systematic collection of organization needs through formal reporting mechanisms, organizational retreats, or monthly communication platforms are adequate ways to document technical assistance for organizations. Findings from Cronin et al. (2014) suggest technical assistance provided at various levels (class, program, and organization) as an effective way to individualize support to meet unique program needs.

Current Focus on Implementation Results

The vast majority of literature discussing TPP program implementation practices derives from the recent 2010 OAH and CDC teen pregnancy prevention program initiatives implemented across the United States. Implementation results spanned school, community, and healthcare settings with adolescents from rural and urban communities aimed at decreasing risky sexual behavior which leads to unplanned pregnancy and increasing use of contraceptive health services. Overarching success in implementing TPP programs with high fidelity to program core components was reported (Farb & Margolis, 2016) and authors discussed barriers to implementation and recommendations for future practice.

In 2014 The Journal of Adolescent Health [JAH] (Farb, Margolis, Rice, & Jensen, 2014) published a special edition titled, *Implementing Evidence-Based Teen*

Pregnancy Prevention Programs: Legislation to Practice which discussed preliminary implementation challenges and lessons learned from the perspectives of the 2010 OAH teen pregnancy prevention replication and innovation program grantees. In 2016, the American Journal of Public Health [AJPH] (Morabia, 2016) followed up with another special edition titled, *Building Evidence to Prevent Adolescent Pregnancy* which compiled 41 program evaluations assessing the effectiveness of replicated and innovative TPP programs. Lastly, in the spring of 2017 The Journal of Adolescent Health (Farb, Margolis, Rice, & Jensen, 2017) released a special edition titled, *Implementing Community-Wide Teen Pregnancy Prevention Initiatives* which discussed results from a National Demonstration Project - Integrating Services, Programs, and Strategies through Community-Wide Initiatives to decrease rates of adolescent unplanned pregnancy. The aforementioned publications contributed several articles and empirical studies to this scoping review.

Implementation practices from interventions on the HHS evidence-based list (Teen Outreach Program (TOP) + text message program called Youth All Engaged! (YAE!) (Bull et al., 2016), Adult Identity Mentoring (Project AIM) & Teen Outreach Program (TOP) (Asheer, Berger, Meckstroth, Kisker, & Keating, 2014), It's Your Game: Keep it Real (IYG) (Potter, Coyle, Glassman, Kershner, & Prince, 2016; Workman, Flynn, Kension, & Prince, 2015) and CDC's Community-Wide Initiatives (Romero et al., 2017) reported meeting requirements for program dosage and fidelity, positive rapport between facilitator and participants, and tailored training and technical assistance provided to organizations and stakeholders.

The most cited barriers to implementation were attrition and low student attendance due to competition from external activities (Robinson, Seibold- Simpson, Crean, & Spruille, 2016) and environmental factors (e.g., time conflicts at implementation sites, & weather delays). Specific results from the Be Proud! Be Responsible program described unique efforts between the TPP program organizers and school administrators to foster relationships of mutual trust and respect which helped increase student attendance and retention during the program period (Lesser et al., 2005). Likewise, Asheer, Berger, Meckstroth, Kisker, & Keating (2014) asserted establishing formal referral partnerships for recruiting and retaining participants was a successful mechanism to mitigate low attendance during the Adult Identity Mentoring (Project AIM) & Teen Outreach Program (TOP) community-based program. The University of Kansas Work Group for Community Health and Development Toolkit (2016) provides guidance for increasing participation from stakeholders during health promotion programs and supports the empirical evidence described in this study.

Recommendations for future practice were provided by many studies in the review and asserted collaborative planning before implementation begins as a critical step to enhance TPP program implementation practices. Walker, Mwaria, Coppola, & Chen (2014) called upon Roger's Diffusion of Innovation Theory (1995) to help structure and assess levels of organizational readiness and capacity prior to TPP program implementation. Working alongside organization staff, partners, and facilitators to determine met and outstanding needs facilitates communication and helps to decrease implementation barriers. Moreover, collaborative pre-implementation planning helps

organizations determine strategies for collecting implementation measurement data (e.g., fidelity monitoring logs, facilitator observations) and outlines the appropriate mechanisms to report data in a timely manner (Tevendale et al., 2017a). Implementing evidence-based programs in teen pregnancy prevention is a complex, on-going process which requires collaboration and support from diverse stakeholder groups. Competing priorities from funding agencies, internal organizational staff, adolescent participants, and environmental factors contribute to challenges and barriers organizations face when attempting to reach successful program implementation outcomes.

Study Limitations and Recommendations for Future Research and Practice

The results of this study are presented with limitations which must be addressed. First, this was a scoping literature review which sought to understand the breadth and depth of published literature discussing teen pregnancy prevention program implementation. The review did not seek to assess the quality of the included studies, a primary element in conducting systematic reviews, and was not registered using the Cochrane Database of Systematic Reviews (Cochrane Library, 2017). Next, results are not generalizable to all public health program implementation settings. Given the inclusion criteria applied to selected studies additional implementation theories, procedures, and evidence may explain program implementation among other health program topics (e.g., ATOD prevention). The results do, however, provide a review of the current state of implementation literature within TPP program research and practice. Last, researcher bias involved in interpreting results and providing recommendations for future implementation practice and cannot be completely dismissed.

As the theoretical, procedural, and empirical results from this review were lacking, they expose areas where future research in theory building, improving organizational capacity, and tailoring training and technical assistance can improve program implementation. Theory building and development activities which posit key drivers involved in the implementation process are needed within adolescent health and teen pregnancy prevention to help provide frameworks communities can use when planning programs. Future studies which apply the Interactive Systems Framework (ISF) or Consolidated Framework for Implementation Research (CFIR) can provide new insights which maximize the implementation environment (e.g., internal and external) affecting program results. Accessing and applying toolkit resources, such as *Getting to Outcomes: Guide for Teen Pregnancy Prevention*, (Chinman, Acosta, Ebener, Sigel, & Keith, 2016) which help community-based organizations and partners improve their implementation capacity is another area of future research. Working with an organization's current structure and resources to find points of leverage for intervention can help facilitate changes needed to sustain long-term implementation practices which benefit the organization and program participants.

Continued support from funding agencies which allow for implementation data collection, reporting, and disseminating is important to further the field's understanding of implementation dynamics and how they shape program outcomes. Future research replicating studies like McCormick, Stecklet, & McLeroy (1995), which investigated school's structure and capacity to implement health education programs and the associated program outcomes could lead to better resource allocation and budget

considerations to support implementation. The field of adolescent sexual health, specifically teen pregnancy prevention, must continue its dedication to applying and supporting implementation science to bridge research and practice in order to improve program delivery models and organizational capacity needed to help implement youth-serving programs.

Conclusions

By conducting this scoping review, we were able to identify valuable information concerning TPP program implementation practices, as well as gaps in the current body of research. Results should be used to inform research, policy, and practice related to implementation of teen pregnancy prevention programs. Implementation is a critical component of health promotion in public and adolescent health which demands continued support and application in community settings. Adolescents need programs which include core components delivered from highly trained and supported facilitators to help improve their sexual and overall health outcomes.

CHAPTER III

PROGRAM IMPLEMENTATION PRACTICES AMONG THE 2010-2014 OFFICE OF ADOLESCENT HEALTH (OAH) TEEN PREGNANCY PREVENTION (TPP) PROGRAM COHORT: RESULTS FROM A CROSS-CASE ANALYSIS

Introduction

Implementation science, as an independent discipline, systematically investigates and strives to increase the uptake of evidence-based research findings into widely adopted community contexts (Teitelman, Bohinski, & Boente, 2009). The discipline applies rigorous research methodologies and theoretical frameworks to address current gaps in translating scientific discovery into action (Durlak & DuPre, 2008). Studying implementation science within public health allows individuals and communities to deconstruct the multifaceted process of implementation to improve programs aimed at increasing health outcomes (Fixsen et al., 2005).

Theoretical frameworks serve as the building blocks for understanding the implementation process and provide structure to implementation science researchers and practitioners. Popular implementation models include Getting to Outcomes (GTO) (Rand Health, 2016), Stages of Implementation Completion (SC) (Saldana, Chamberlain, Wang, & Hendericks, 2012), and Theory of Organizational Readiness for Change (Weiner, 2009). These theoretical models and approaches provide better understanding and explanation of how and why implementation succeeds or fails

(Nilsen, 2015) and can assist professionals in selecting and adopting relevant approaches for implementation practice.

One of the most comprehensive theoretical contributions to implementation science derives from Damschroder and colleagues (2009) titled the Consolidated Framework for Implementation Research (CFIR). CFIR provides an overarching typology which promotes implementation theory development and verification about what implementation practices work within various contexts (Damschroder et al., 2009). The CFIR framework contains five domains — Intervention Characteristics, Outer Setting, Inner Setting, Characteristics of the Individuals, Process— and 39 sub-constructs to describe implementation practice (Damschroder et al., 2009). Sub-constructs include Domain 1. Intervention Characteristics: Intervention Source, Evidence Strength & Quality, Relative Advantage, Adaptability, Trialability, Complexity, Design Quality & Packaging, and Cost; Domain 2. Outer Setting: Patient Needs & Resources, Cosmopolitanism, Peer Pressure, External Policy & Incentives; Domain 3. Inner Setting: Structural Characteristics, Networks & Communications, Culture, Implementation Climate, Tension for Change, Compatibility, Relative Priority, Organizational Incentives & Rewards, Goals and Feedback, Learning Climate, Readiness for Implementation, Leadership Engagement, Available Resources, Access to Knowledge & Information; Domain 4. Characteristics of Individuals: Knowledge & Beliefs about the Intervention, Self-efficacy, Individual Stage of Change, Individual Identification with Organization, Other Personal Attributes; and Domain 5. Process: Planning, Engaging, Opinion Leaders, Formally Appointed Internal Implementation

Leaders, Champions, External Change Agents, Executing, Reflecting & Evaluating (Damschroder et al., 2009).

The CFIR has been used to evaluate intervention and implementation-level outcomes related to public hospital system implementation, assessing care-based best-practices in rural health contexts, and as a protocol for assessing children's mental health and social services (Damschroder & Lowery, 2013; English et al., 2011; Powell et al., 2013). The CFIR Zotero electronic database catalogs peer-reviewed studies (i.e., synthesis, empirical results, protocols, editorials) which apply CFIR to a variety of other health topics (Consolidated Framework for Implementation Research, 2014). While the evidence base using CFIR is continuously growing, a lack of application of the CFIR model within adolescent health, specifically teen pregnancy prevention served as a primary motive for conducting this study.

Implementation Science in Adolescent Health and Teen Pregnancy Prevention (TPP)

Implementing health programs is a complex process, shaped by multilevel factors, which impacts what information and resources are provided to target audiences (Fixsen et al., 2005). Program implementation involves a defined set of activities designed to practice and apply known elements of the program through strategic and purposeful action (National Implementation Research Network, n.d.). According to a synthesis of program implementation literature, Fixsen et al., (2005) concluded that three elements are needed for successful implementation: Core Implementation Components (i.e., Training, Coaching, Performance Measurement), Organizational Components (i.e.,

Selection, Program Evaluation, Administrative Support) and Influence Factors (i.e., Social, Economic, Political) (p. 59). The synergy of these factors faciliate opportunities for organizations and individuals to implement programs effectively and with high fidelity.

Within the field of teen pregnancy prevention, program implementation may occur in multiple settings, including schools, community settings, healthcare clinics, and faith-based organizations (Centers for Disease Control and Prevention [CDC], 2016). A majority of current implementation practices consists of curriculum-based programs aiming to change individual-level behavior among adolescents as a mechanism to decrease or prevent unplanned pregnancy and/or rates of STI/HIV transmission (Kirby, 2007). Programs that create opportunities for adolescents to improve their sexual health and contraception knowledge and practice skills in communication, negotiation/refusal have been shown as effective in decreasing sexual risk-taking behaviors associated with unplanned pregnancy (Kirby, 2007; Farb & Margolis, 2016). Increased support for implementing and evaluating effective TPP programs is evidenced by recent federal grant programs and funding mechanisms dedicated to delivering TPP programs to adolescents across the United States (OAH, 2016a).

To help combat issues of adolescent sexual risk-taking and unplanned pregnancy the Office of Adolescent Health (OAH) allocated funding which supported organizations and community-based groups to implement rigorously evaluated evidence-based and innovative TPP programs in 2010 (OAH, 2016a). The Teen Pregnancy Prevention (TPP) Program appropriated $75 million for replication of programs shown to be effective

through rigorous evaluation (Tier 1) (See Appendix B) and $25 million for research and demonstration to develop and test innovative new programs (Tier 2) (Department of Health & Human Services, 2015; Mathematica Policy Research, 2011) in community and school settings. During 2010-2015 OAH provided grant support to its first TPP cohort, 102 grantees, for a five-year period to implement evidence-based and evidence-informed TPP programs across 39 states and Washington D.C. (OAH, 2016a). The 2010 initiative, dedicated to improving the health and wellbeing of adolescents, funded implementation and evaluation of 23 evidence-based program models and 19 new innovative TPP program approaches (OAH, 2016b; 2016c).

The 2010 OAH TPP Program established the first step in aggregating and expanding the teen pregnancy prevention evidence base. Funding at Tier I (replication) and Tier II (innovation) through OAH provided the structure needed to determine if existing evidence of effective TPP programs (Mathematica Policy Research, 2011) could be replicated in new settings with new target populations, along with creating spaces for new and non-evaluated programs to receive support towards rigorous evaluation (Farb & Margolis, 2016). As part of the awarded TPP funding, OAH required grantees to provide results from both an impact study (i.e., effects of TPP program on adolescents' behavior and cognition) and an implementation study (i.e., report of program fidelity, dosage, and realistic delivery) by the conclusion of the project period.

Specific to the implementation study, funded programs were required to establish a phase-in implementation period which lasted up to one year prior to full program roll-out to allow time for thorough needs assessments strategies and partner development

(Farb & Margolis, 2016). Tier I and II programs were required to maintain fidelity to the program model, achieve consistently high quality interactions and engagement from participants and staff, and provide medically-accurate and age-appropriate program content (Farb & Margolis, 2016). Lastly, Tier I and II programs were required to report four implementation performance measures (adherence, quality, counterfactual, and context) that OAH determined as critical to program implementation success (Farb & Margolis, 2016). Table 1 details questions used to assess each OAH implementation performance measure.

Table 1. The 2010-2014 Office of Adolescent Health Teen Pregnancy Prevention Program Implementation Performance Measure

Element	Questions (n=13)
Adherence	Q1. How often were sessions offered? How many were offered? Q2. What and how much was received? Q3. What content was delivered to youth? Q4: Who delivered material to youth?
Quality	Q1. Quality of Staff-participant interactions.
Counterfactual	Q1. How often were sessions offered? How many were offered? Q2. What and how much was received? Q3. What content was delivered to youth? Q4. Who delivered materials to youth?
Context	Q1. Other TPP programming available or offered to study participants (Both intervention & comparison) Q2. External events affecting implementation Q3. Substantial unplanned adaption(s)

Evidence from the theoretical frameworks used to guide program implementation across various health topics and the recent funding to evaluate implementation science among adolescent health programs led to the primary rationale for completing this study. Applying CFIR within the context of federally-funded TPP programs to understand the complexity and driving factors affecting implementation is absent from the extant literature. Furthermore, assessing the state of the recent 2010-2014 OAH TPP Tier I and II implementation results has not yet been documented. Theoretical and empirical evidence contributes to current gaps in knowledge about how to sustain effective implementation practices and improve challenging areas within teen pregnancy prevention.

The overall purpose of the cross-case study was *to investigate the implementation practices among a case sample of TPP program models using theoretical and applied research frameworks.* The research questions which guided this cross-case investigation included (1) *to what extent does the Implementation Science CFIR describe the implementation practices among the 2010-2014 Office of Adolescent Health Teen Pregnancy Prevention Program cohort?* and *(2) to what extent are results from implementation performance measures (i.e., Adherence, Quality, and Context) similar or different across the 2010-2014 OAH TPP program cohort?*

Methods

Study Design and Epistemology

The study design used in this investigation was a qualitative cross-case analysis following protocols proposed by Miles, Huberman, & Saldana (2013). Cross-case

analyses is a valuable analytic technique because it is a systematic method which allows for the inclusion of diverse evidence types and can be utilized for theory-building or conceptual contributions to the literature. The epistemological paradigm supporting this study was *critical realism*, which asserts reality is determined by "three levels: an empirical level consisting of experienced events, an actual level of all events, whether experienced or not, and a causal level composed of situations, conditions, and mechanisms leading to these events" (Ott, Rouse, Ressequie, Smith, & Woodcox, 2011, p. 3; Houston, 2001). Researchers conducting this study assumed a relationship existed among theoretical assumptions which guide implementation (CFIR), empirical observations describing implementation (OAH performance measures), and actual implementation events and experiences, documented and undocumented (exploratory themes), which described TPP program implementation as a socially-constructed phenomena worthy of study. This paradigm and theoretical perspective allowed for examination of the TPP case implementation practices within the actual contexts in which programs were delivered (e.g., school/community or healthcare settings), and for analyses of factors, both theoretical and applied, which contributed to case program implementation. The theorized relationship guiding the analyses and results interpretation is presented in Figure 2.

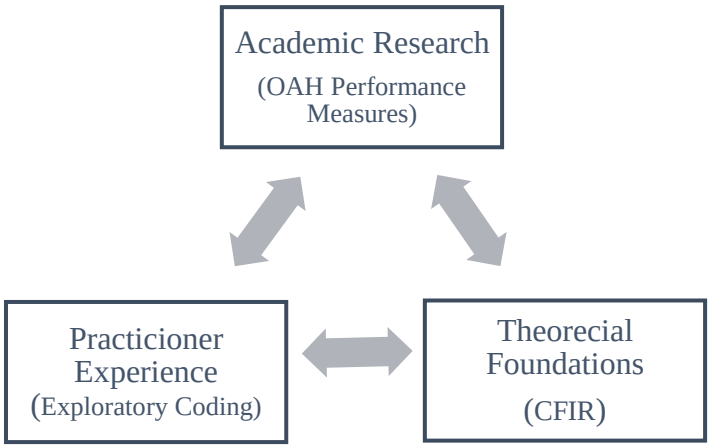

Figure 2. Hypothesized Relationship among Teen Pregnancy Prevention Program Implementation Theory, Research, and Practice.

Sample Cases

Program evaluation reports (n=29) from the first cohort (2010-2014) of OAH TPP program (Tier I and Tier II) grantees were collected and used for this study. Tier I evaluation reports included implementation data from replications of TPP evidence-based interventions (EBIs) across the United States (n=15), while the Tier II evaluation reports described implementation data from new demonstration and/or innovative TPP program models (n=14). Grantees were required to report data from the impact study (i.e., Randomized Controlled Trial, Quasi-Experimental) investigating the effectiveness of the TPP program, in addition to implementation data which described the processes

and/or practices used to deliver the TPP program to adolescents. The reports were available through OAH's website in spring 2016 and accessed upon the approved release date (http://www.hhs.gov/ash/oah/oah-initiatives/tpp_program/). Personal information for participants in the evaluation (adolescents and adults) were stripped from the dataset, thus the Texas A&M University Institutional Review Board (IRB) did not require a study application for review and approval (See Appendix C). Each individual evaluation report served as a single case in this cross-case study investigation.

The OAH provided each TPP program grantee with a study reporting template, which outlined required data for the impact and implementation studies. Implementation results aligned to four performance measures, *Adherence, Quality, Counterfactual (Control), and Context* measured by a set of 13 question (See Table 1). Additionally, TPP program grantees were asked to provide results describing (a) types of data used to assess each performance measure (e.g., number of topics covered); (b) the frequency/sampling of data collection (e.g., classroom observations); (c) methodology used to collect data on each performance measure (e.g., fidelity monitoring logs); and (d) the party responsible for data collection (e.g., program staff). The OAH evaluation report template can be viewed in Appendix D.

Data Collection & Coding Procedures

The review team comprised of 4 trained researchers experienced in teen pregnancy prevention program research and qualitative inquiry. The principal investigator conducted all deductive and inductive coding procedures then facilitated inter-coder reliability audits with the review team during the analyses phase of the

project (Lincoln & Guba, 1985). The coding and subsequent analyses were multistage and iterative which allowed for saturation of codes, categories, themes needed to expose patterns in the data and generate insights to answer the study research questions (Creswell, 2013; Lincoln & Guba, 1985).

Coding each TPP evaluation case report involved both deductive and inductive systematic coding strategies (Lincoln & Guba, 1985). The CFIR served as the base to guide deductive coding and helped to generate initial lists of code categories for analysis. Initially, the five domains and all 39 sub-constructs of the CFIR were re-named for ease during coding. For example, Domain 2 *Outer Setting* was re-coded as *Community*, and 2.1 originally, Patient Needs & Resources, was renamed as Needs Assessment. See Table 2 for adapted CFIR model which includes sub-constructs relevant to this study.

Next, the principal investigator used a confirmatory coding schema (Lincoln & Guba, 1985) to determine how the CFIR aligned with TPP program implementation evidence. Case reports were coded using all five domains and sub-constructs from the CFIR (Damschroder et al., 2009) and yielded an initial list of codes and units of data (e.g., words, sentences, or paragraphs) which confirmed each area of the theorized framework. A visual data matrix was created to organize data by each CFIR domain and sub-construct needed for analysis (Miles, Huberman, & Saldana, 2013). (See Appendix E for CFIR domain and sub-construct codebook).

Table 2. Description of Consolidated Framework for Implementation Research (CFIR) Domains and Sub-Constructs Adapted for Teen Pregnancy Prevention (TPP) Program Implementation

I. Intervention (Sub-constructs n=4)	**II. Community (Sub-constructs n=4)**	**III. Organization (Sub-constructs n=4)**	**IV. Facilitator (Sub-constructs n=5)**	**V. Process (Sub-constructs n=5)**
1.1 Intervention Source: *Perception of key stakeholders about whether the intervention is externally or internally developed*	2.1 Needs Assessment: *The extent to which patient needs, as well as barriers and facilitators to meet those needs are accurately known and prioritized by the organization*	3.1 Structure: *The social architecture, age, maturity, and size of an organization*	4.1 Knowledge & Beliefs about the Innovation: *Individuals' attitudes toward and value placed on the intervention as well as familiarity with facts, truths, and principles related to the intervention*	5.2.4 External Change Agents (Engage): *Individuals who are affiliated with an outside entity who formally influence or facilitate intervention decisions in a desirable direction*
1.2 Strength of Evidence: *Stakeholders' perceptions of the quality and validity of evidence supporting the belief that the intervention will have desired outcomes*	2.2 Networks: *The degree to which an organization is networked with other external organizations*	3.2 Networks & Communications: *The nature and quality of webs of social networks and the nature and quality of formal and informal communications within an organization*	4.2 Self-Efficacy: *Individual belief in their own capabilities to execute courses of action to achieve implementation goals*	5.3 Executing: *Carrying out or accomplishing the implementation according to plan*
1.3 Relative Advantage: *Stakeholders' perception of the advantage of implementing the intervention versus an alternative solution*	2.3 Competition: *Mimetic or competitive pressure to implement an intervention; typically because most or other key peer or competing organizations have already implemented or in a bid for a competitive edge*	3.5 Readiness for Implementation: *Tangible and immediate indicators of organizational commitment to its decision to implement an intervention*	4.3 Individual Stage of Change: *Characterization of the phase an individual is in, as he or she progresses toward skilled, enthusiastic, and sustained use of the intervention*	5.4 Reflecting & Evaluating: *Quantitative and qualitative feedback about the progress and quality of implementation accompanied with regular personal and team debriefing about progress and experience*

Table 2. Continued.

1. Intervention (Sub-constructs n=4)	2. Community (Sub-constructs n=4)	3. Organization (Sub-constructs n=4)	4. Facilitator (Sub-constructs n=5)	5. Process (Sub-constructs n=5)
1.4 Adaptability: *The degree to which an intervention can be adapted, tailored, refined, or reinvented to meet local needs*	2.4 External Policy: *External strategies to spread interventions including policy and regulations (governmental or other central entity), external mandates, recommendations and guidelines, pay-for-performance, collaborative, and public or benchmark reporting*	3.5.2 Available Resources: *The level of resources dedicated for implementation and on-going operations including money, training, and education, physical space, and time*	4.4 Individual Identification with Organization: *A broad construct related to how individuals perceive the organization and their relationship and degree of commitment with that organization*	
			4.5 Other Personal Attributes: *A construct including other personal traits such as tolerance of ambiguity, intellectual ability, motivation, values, competence, capacity, and learning style*	

TPP program case reports were coded using the four OAH implementation performance measures (Adherence, Quality, Counterfactual, and Context). Following a similar confirmatory coding schema, data units were abstracted according to their representation of Adherence, Quality, Counterfactual, and Context contributing to TPP program implementation. The principal investigator also coded case reports for a) types of data used to assess each performance measure, b) the frequency/sampling of data collection, c) methodology used for data collection, and d) the party responsible for data collection on performance measure. The codes abstracted during the OAH confirmatory coding process were organized into a data matrix for analysis (Miles, Huberman, & Saldana, 2013). See Table 1 for OAH TPP implementation performance measures and Appendix F for codebook.

Finally, an inductive coding approach (Glaser & Strauss, 1967) was used to stimulate original insights about the data and explore patterns and themes across each TPP evaluation case report (Zhang & Wildemuth, n.d.). The exploratory approach allowed the theory to emerge from the data (Corbin & Strauss, 2008) and was guided by the constant comparison technique (Neuendorf, 2002; Glaser & Strauss, 1967). Constant comparison allowed the principal investigator to systematically compare text assigned to code categories and integrate categories together based on complementary properties. Program evaluation reports were examined line-by-line and assigned "open codes" in the initial phase, followed by related codes linked to form broader categories or "axial codes" (Corbin & Strauss, 2008). Code categories were input into a data matrix for organization and analysis (Miles, Huberman, & Saldana, 2013).

Data Analysis

Qualitative data were analyzed using computer assisted qualitative data analysis software (CAQDAS), ATLAS.ti (Berlin, Scientific Software Development, 1999). The principal investigator and trained reviewers analyzed (a) data for the inclusion of CFIR constructs and OAH implementation performance measures; and (b) factors affecting TPP program implementation to identify patterns and themes emergent across the Tier I and Tier II program reports.

Inter-Coder Reliability Audit. Confirmatory and exploratory codes and categories were presented to the review team during inter-code reliability audit meetings. First, the review team analyzed data units coded from the theoretical framework, CFIR domains and sub-constructs, and OAH implementation performance measures. Next, the review team assessed data units describing the proposed exploratory codes and categories. Discussions of agreement and/or disagreement provided justification for iterations to the code categories and served as the formal inter-code reliability audit for this study. The inter-code reliability process was a critical step in the analysis process and "… is often perceived as the standard measure of research quality. High levels of disagreement among judges suggest weaknesses in research methods, including the possibility of poor operational definitions, categories, and judge training" (Kolbe & Bennet, 1991, p. 248).

The inter-coder reliability audit was used to validate data results, guide study interpretations, and served as a measure to increase creditability, a criteria of qualitative trustworthiness (Lincoln & Guba, 1985). Furthermore, to capture different dimensions of

TPP program implementation across multiple sites, data triangulation using written research memos and field notes, extant peer-reviewed literature from adolescent health and teen pregnancy prevention, anecdotal data from past empirical TPP research projects, and detailed code and category definitions were used (Creswell, 2013; Dixon-Woods, Agarwal, Jones, Young, & Sutton, 2005; Lincoln & Guba, 1985; Thomas, 2006).

Findings

The goal of this qualitative cross-case investigation was to describe the theoretical and applied implementation practices among the 2010-2014 OAH TPPP programs. As such, results are presented in four sections: (a) descriptive explanation of TPP program type and level of intervention, (b) theoretical alignment of the CFIR describing TPP program implementation, (c) summary of OAH implementation performance measure results across cases, and (d) major themes and sub-themes from exploratory coding which illustrate TPP program implementation. Salient quotes from multiple cases are included to illustrate evidence of key findings among sections b, c, and d.

TPP Program Description

The 2010-2014 OAH Teen Pregnancy Prevention Program funded school districts and community-based organizations to implement replications of evidence-based programs (Tier I) and/or demonstration and innovation programs (Tier II). While 41 sites across the United States received Tier I or II funding for implementation, 29 programs (70%) published publicly-available evaluation reports and constituted the final

sample for this cross-case study. Of the 29 TPP programs, 52% (n=15) reported Tier I findings (replication of a TPP EBI) and 48% (n=14) reported Tier II findings (demonstrate/innovative program) from implementation (Figure 3).

Among the 15 Tier I EBI replication projects, 53% (n=8) of programs utilized curriculum intended to change individual health behaviors (i.e., intrapersonal-level) (The Policy & Research Group, 2015a; Coyle et al., 2016; Walker, Inoa, & Coppola, 2016; Herrling, 2015; Tucker, & Associates, 2015; Coyle, Potter, Glassman, McDade-Montez, & Unti, 2015; The Policy & Research Group, 2015b; Eichner, Salaway, Smith-Jones, & McCall, 2015), while 47% (n=7) of programs utilized curriculum grounded in youth development principles intended to change peer/social norms (i.e., interpersonal-level) (Seshadri et al., 2015; Crean, Seibold-Simpson, Jambon, & Kreipe, 2015; Daley et al., 2015; Francis, Woodford, & Kelsey, 2015; Philiber, Philiber, & Brown, 2015; Robinson, Kaufman, & Cahill, 2016; Philiber & Philiber, 2016) No Tier I replication programs used curriculum targeting community or policy-level changes (Figure 4).

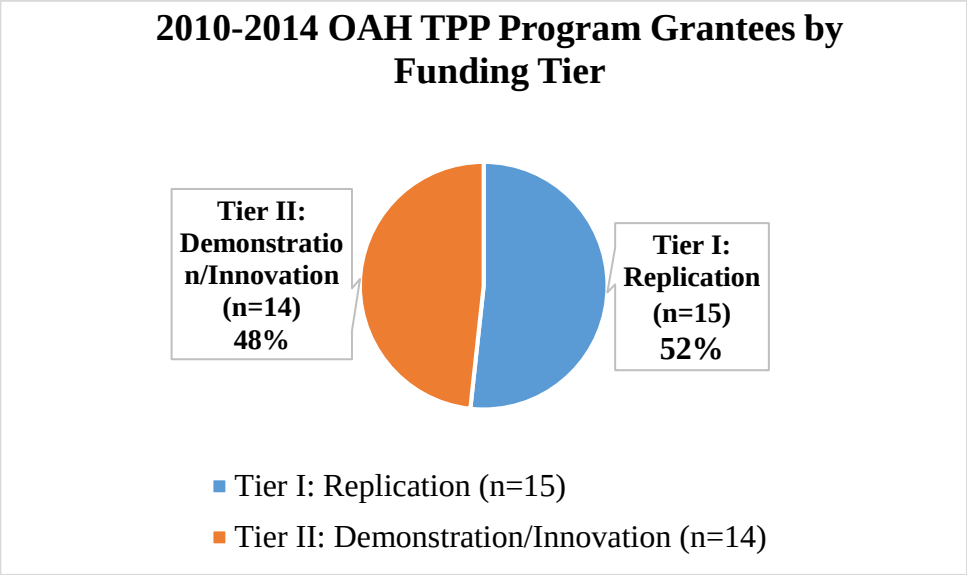

Figure 3. The 2010-2014 Office of Adolescent Health (OAH) Teen Pregnancy Prevention (TPP) Program Grantees by Funding

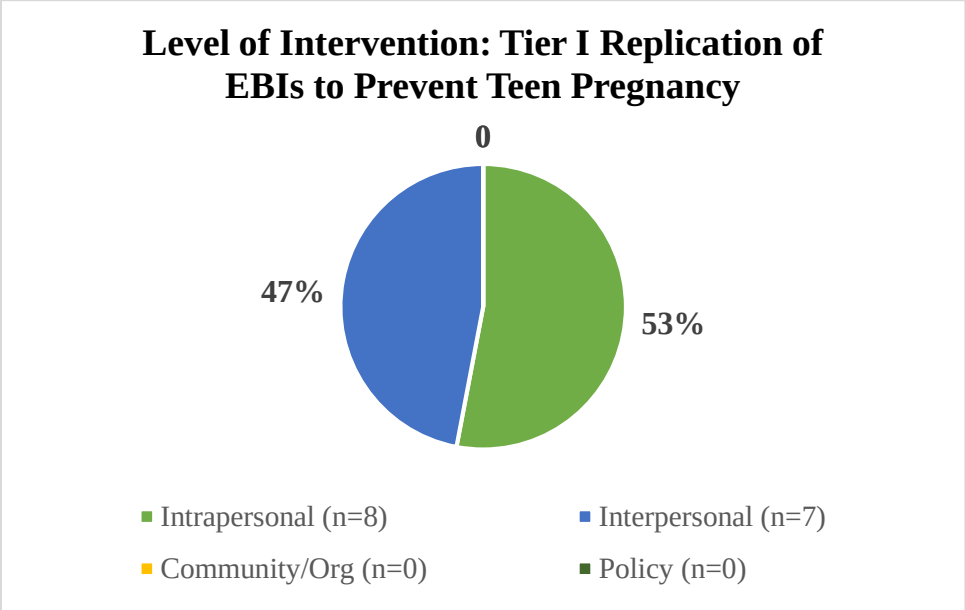

Figure 4. The 2010-2014 Office of Adolescent Health (OAH) Teen Pregnancy Prevention (TPP) Program Tier I Replication Programs: Level of Intervention

The most common implementation setting for Tier I replication programs was community spaces (n=9, 60%) (The Policy & Research Group, 2015a; Seshadri et al., 2015; Crean, Seibold-Simpson, Jambon, & Kreipe, 2015; Daley et al., 2015; Francis, Woodford, & Kelsey, 2015; Philiber, Philiber, & Brown, 2015; Robinson, Kaufman, & Cahill, 2016; Tucker, & Associates, 2015; Philiber & Philiber, 2016) followed by schools (n=4, 27%) (Herrling, 2015; Coyle et al., 2016; Coyle, Potter, Glassman, McDade-Montez, & Unti, 2015; Walker, Inoa, & Coppola, 2016), healthcare clinics (n=1, 6%) (The Policy & Research Group, 2015b), and online delivery environments (n=1, 6%) (Eichner, Salaway, Smith-Jones, & McCall, 2015) (Figure 5).

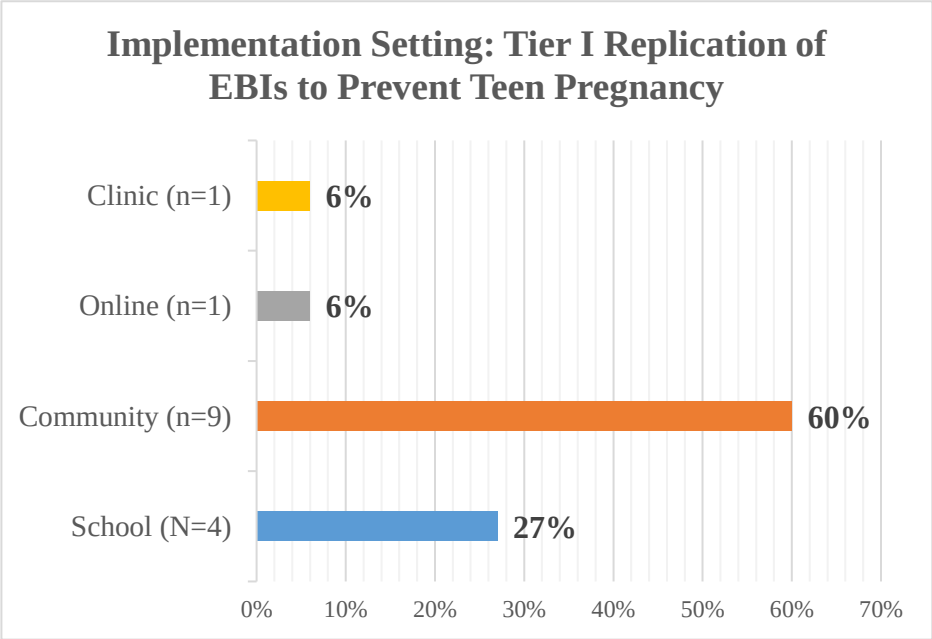

Figure 5. The 2010-2014 Office of Adolescent Health (OAH) Teen Pregnancy Prevention (TPP) Program Tier I Replication Programs: Implementation Setting

Among the 14 Tier II demonstration/innovation programs, 86% (n=12) of programs utilized curriculum intended to change individual health behaviors (i.e., intrapersonal-level) (Martin, Hill, Nye, & Hollman-Billermeier, 2015; Kissinger et al., 2015; Slater, & Mitschke, 2015; Ruwe, McCloskey, Meyers, Prudent, & Foureau-Dorsinville, 2016; Calise, Chow, & Dore, 2015; Dierschke, Gelfond, Lowe, Schenken, & Plastino, 2015; Abe, Barker, Chan, & Eucogco, 2015; LaChausse, 2015; Advanced Empirical Solutions, 2015; Cunningham, van Zyl, & Borders, 2016; Vyas, Wood, Landry, Douglass, & Fallon, 2015; Schwinn et al., 2015), while 14% (n=2) of programs utilized curriculum grounded in youth development principles intended to change peer/social norms (i.e., interpersonal-level) (Bull, Schmiege, & Devine, 2015; Carter, Beadnell, & Vankslyke, 2015). No Tier II demonstration/innovation programs used curriculum targeting community or policy-level changes (Figure 6). Schools were the most common implementation setting for Tier II demonstration/innovation programs (n=11, 79%) (Martin, Hill, Nye, & Hollman-Billermeier, 2015; Kissinger et al., 2015; Slater, & Mitschke, 2015; Ruwe, McCloskey, Meyers, Prudent, & Foureau-Dorsinville, 2016; Calise, Chow, & Dore, 2015; Dierschke, Gelfond, Lowe, Schenken, & Plastino, 2015; Abe, Barker, Chan, & Eucogco, 2015; LaChausse, 2015; Advanced Empirical Solutions, 2015; Carter, Beadnell, & Vankslyke, 2015; Cunningham, van Zyl, & Borders, 2016), followed by online delivery environments (n=2, 14%) (Kissinger et al., 2015; Schwinn et al., 2015), and community spaces (n=1, 7%) (Bull, Schmiege, & Devine, 2015) (Figure 7).

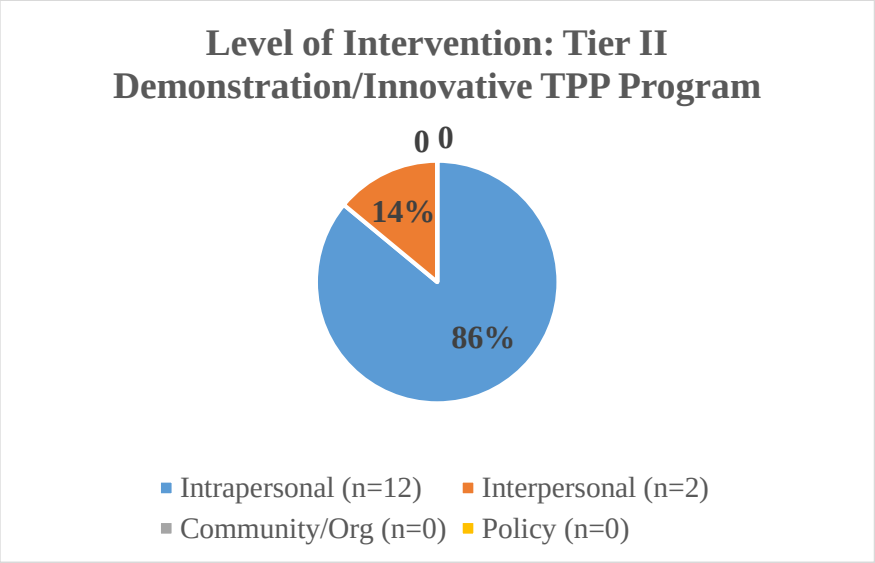

Figure 6. The 2010-2014 Office of Adolescent Health (OAH) Teen Pregnancy Prevention (TPP) Program Tier II Demonstration/Innovative TPP Programs: Level of Intervention

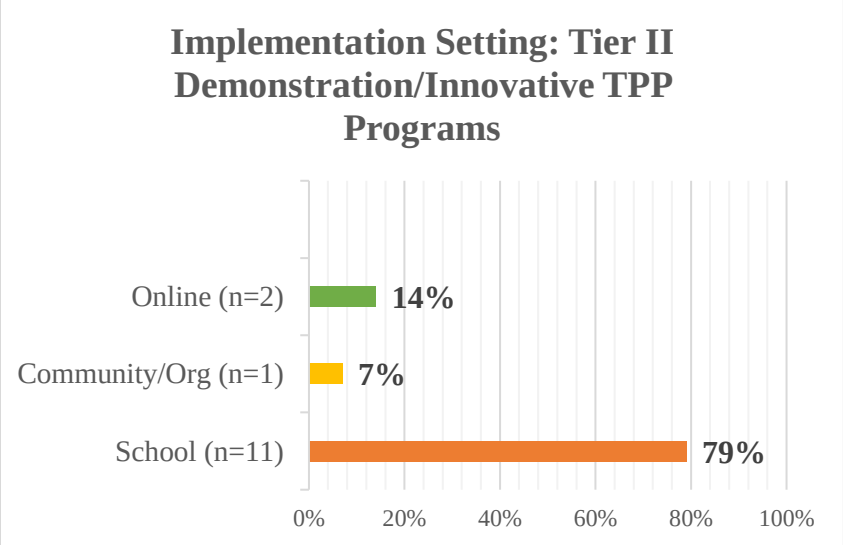

Figure 7. The 2010-2014 Office of Adolescent Health (OAH) Teen Pregnancy Prevention (TPP) Program Tier II Demonstration/Innovative TPP Programs: Implementation Setting

CFIR Domains and Construct Adaptation

As described in the introduction to this study, the original CFIR described five domains (Intervention characteristics, Outer setting, Inner setting, Characteristics of Individuals, and Process) and 39 sub-constructs which detailed factors affecting implementation (Damschroder et al., 2008). Results from the deductive coding process concluded the following: The five domains of CFIR remained relevant (Intervention, Organization, Community, Facilitators, and Process); however, only 20 sub-constructs aligned with the TPP implementation evidence. Fifty-one percent (20 out of 39 sub-constructs) of the CFIR model accurately described the 2010-2014 OAH TPP program implementation evidence.

Tier I Results. Table 3 displays data results for Tier I and II TPP programs aligned with the adapted CFIR theoretical model. Key insights and evaluation case report quotations are described below.

Table 3. Consolidated Framework for Implementation Research (CFIR) Reporting Results

Tier	Program Title	CFIR Domains																		
		Intervention				Organization				Community				Facilitators					Process		
		1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.1	3.2	3.5	3.5.2	4.1	4.2	4.3	4.4	4.5	5.2.4	5.3	5.4
I. TPP EBI Replication	Becoming a Responsible Teen (BART), Louisiana Public Health Institute; New Orleans, Louisiana	●	●		●	●			●	●	●		●	●	●			●		●	
	Children's Aid Society/Carrera Adolescent Pregnancy Prevention Program (CAS), Morehouse School of Medicine; Atlanta, Georgia		●	●	●	●		●	●	●		●	●	●						●	
	Children's Aid Society/Carrera Adolescent Pregnancy Prevention Program (CAS), Children's Home & Aid Society of Illinois; Chicago, Illinois					●	●		●	●			●	●						●	
	It's Your Game: Keep it Real (IYG), University of Texas Health Science Center at Houston; Houston, Texas				●	●			●		●		●	●	●					●	●
	It's Your Game: Keep it Real (IYG), South Carolina Campaign To Prevent Teen Pregnancy; Columbia, South Carolina		●		●	●			●				●		●				●	●	●
	Promoting Health Among Teens! Abstinence-Only, Program Reach, Inc.; Yonkers, New York		●		●	●			●				●	●		●				●	●
	Teen Outreach Program (TOP), Chicago Public Schools; Chicago, Illinois				●	●	●		●		●		●	●				●		●	
	Teen Outreach Program (TOP), City of Rochester Bureau of Youth Services; Rochester, New York				●	●	●	●	●				●	●						●	●
	Teen Outreach Program (TOP), Florida Department of Health; Tallahassee, Florida	●				●		●	●				●	●						●	●
	Teen Outreach Program (TOP), Hennepin County Human Services and Public Health Department; Minneapolis, Minnesota				●	●	●		●				●	●						●	●
	Teen Outreach Program (TOP), Louisiana DHH Office of Public Health; New Orleans, Louisiana		●		●	●		●	●	●			●	●						●	●
	Teen Outreach Program (TOP), Planned Parenthood of the Great Northwest; Seattle, Washington				●	●	●		●		●		●	●						●	●
	Teen Outreach Program (TOP), The Women's Clinic of Kansas City; Independence, Missouri		●		●	●	●		●		●		●				●			●	●
	Safer Sex; Louisiana Public Health Institute; New Orleans, Louisiana		●		●	●	●	●	●		●		●	●						●	●
	Seventeen Days, Carnegie Mellon University; Pittsburgh, Pennsylvania				●	●			●	●			●							●	

Table 3. Continued

Tier	Program Title	CFIR Domains																		
		Intervention				Organization				Community				Facilitator					Process		
		1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.1	3.2	3.5	3.5.2	4.1	4.2	4.3	4.4	4.5	5.2.4	5.3	5.4
II. Demonstration/Innovation TPP Programs	Alaska Promoting Health Among Teens, Comprehensive Abstinence and Safer Sex Practices (AKPHAT Comp), State of Alaska, Department of Health and Social Services; Anchorage, Alaska	●	●		●	●	●		●				●							●	●
	Be yoU, Talented, Informed, Fearless, Uncompromised, and Loved (BUtiful)-- Adaptation of SiHLE, Tulane University School of Public Health and Tropical Medicine; New Orleans, Louisiana	●	●			●			●				●							●	●
	Be Yourself/Se Tu Mismo, George Washington University; Washington, DC		●			●	●		●		●		●	●						●	●
	Crossroads, Arlington Independent School District; Arlington, Texas				●	●			●				●	●						●	●
	Haitian American Responsible Teens (HART), Boston Medical Center; Boston, Massachusetts	●	●		●	●			●				●		●					●	
	Healthy Futures, Black Ministerial Alliance of Greater Boston; Boston, Massachusetts		●		●	●			●		●		●	●	●			●		●	●
	Multimedia Circle of Life (mCOL), University of Colorado Denver; Denver, Colorado		●		●	●	●		●				●	●						●	●
	Need to Know (N2K), University of Texas Health Science Center at San Antonio; San Antonio, Texas		●			●			●		●		●	●						●	●
	Pono Choices, University of Hawaii; Honolulu, Hawaii		●		●	●	●		●				●							●	
	Positive Prevention PLUS, San Bernardino Country Superintendent of Schools; San Bernardino, California		●			●			●				●	●	●					●	●
	Will Power/Won't Power, Volunteers of America, Greater Los Angeles; Los Angeles, California	●				●			●		●		●	●						●	
	Reducing the Risk and Love Notes, University of Louisville; Louisville, Kentucky				●	●	●		●				●	●						●	●
	Teen Outreach Program Plus Youth All Engaged (text messaging), Denver Health and Hospital Authority; Denver, Colorado				●	●	●	●	●				●							●	
	Web of Life, National Indian Youth Leadership Project; Gallup, New Mexico		●		●	●	●		●					●						●	

First, all Tier I TPP case reports (n=29) included data aligned to Domain 2 Organization, sub-construct 2.1 (Needs Assessment) and 2.4 (External Policy & Incentives); Domain 3 Community, sub-construct 3.5.2 (Available Resources); and Domain 5 Process, sub-construct 5.3 (Execute) (The Policy & Research Group, 2015a; Coyle et al., 2016; Walker, Inoa, & Coppola, 2016; Seshadri et al., 2015; Crean, Seibold-Simpson, Jambon, & Kreipe, 2015; Daley et al., 2015; Francis, Woodford, & Kelsey, 2015; Philiber, Philiber, & Brown, 2015; Robinson, Kaufman, & Cahill, 2016; Herrling, 2015; Tucker, & Associates, 2015; Coyle, Potter, Glassman, McDade-Montez, & Unti, 2015; Philiber & Philiber, 2016; The Policy & Research Group, 2015b; Eichner, Salaway, Smith-Jones, & McCall, 2015). OAH funding and reporting requirements dictated the universal coverage of these four CFIR constructs. For example, Tier I TPP programs were required to include needs assessment data in the final evaluation report (2.1 Need Assessment) to illustrate the justification for providing the TPP program in their community, while also fully disclosing their implementation practices throughout the program period (5.3 Execute). Additionally, the OAH provided extensive Training and Technical Assistance support (Farb & Margolis, 2016) which was perceived by program implementers as CFIR sub-construct (3.5.2 Available Resources) and captured in the final case reports. Robinson, Kaufman, & Cahill (2016) who evaluated The Teen Outreach Program (TOP®) in New Orleans, LA and Rochester, NY, reported,

> Formal written feedback was provided to agency [OAH] and program staff approximately two weeks after observations in order to support improvement in implementation fidelity and quality (p. 8).

Next, Tier I case reports described programs which implemented the Teen Outreach Program (TOP®) (n=7) across the United States, a youth development-centered interpersonal curriculum, and reported more data aligned with the CFIR Domain 2 Organization and Domain 3 Community (Seshadri et al., 2015; Crean, Seibold-Simpson, Jambon, & Kreipe, 2015; Daley et al., 2015; Francis, Woodford, & Kelsey, 2015; Philiber, Philiber, & Brown, 2015). One of the goals of the Teen Outreach Program (TOP®) is to promote healthy behaviors and teach life skills through community engagement (Daley et al., 2015), and as such these programs had better connectivity and partnerships with community for implementation. CFIR sub-constructs 2.1 (Needs Assessment), 2.2 (Networks), 2.3 (Competition), 2.4 (External Policy and Incentives) and 3.1 (Structural Characteristics), 3.2 Organization Communications), 3.5 (Readiness for Implementation), and 3.5.2 (Available Resources) described the internal organization and external community environments which facilitated implementation. To illustrate Domain 2 Organization, 2.2 (Networks), Francis, Woodford, & Kelsey (2015) who evaluated the TOP® in Minneapolis, Minnesota described,

> The county partnered with three community-based organizations (CBOs) with experience providing sexual health programming to youth. The CBOs were responsible for: hiring and supervising staff to be frontline TOP® facilitators; recruiting schools, completing memorandums of understanding with each, and collaborating with classroom teachers to co-facilitate TOP®; collaborating with Hennepin County to ensure that the intervention was delivered with fidelity to

> the standards outlined by the program developer and OAH; and participating in ongoing training and technical assistance provided by Hennepin County (p. 6).

The third insights from the Tier I reports and alignment to CFIR is related to Domain 4 Facilitator, Sub-construct 4.1. Twelve of the 15 programs (80%) reported data describing the facilitator's perceived interest in the intervention or their familiarity with facts, truths, or principles central to the TPP program (The Policy & Research Group, 2015a; Walker, Inoa, & Coppola, 2016; Seshadri et al., 2015; Crean, Seibold-Simpson, Jambon, & Kreipe, 2015; Daley et al., 2015; Francis, Woodford, & Kelsey, 2015; Philiber, Philiber, & Brown, 2015; Robinson, Kaufman, & Cahill, 2016; Herrling, 2015; Tucker, & Associates, 2015; Coyle, Potter, Glassman, McDade-Montez, & Unti, 2015; The Policy & Research Group, 2015b). The facilitators' knowledge and beliefs, positive or negative, about the TPP program were often captured during pre- and on-going training opportunities and through support mechanisms (i.e., conference calls) facilitators received during program implementation. Herrling (2015) reported during The Children's Aid Society/Carrera Adolescent Pregnancy Prevention Program (CAS) in Chicago, Illinois,

> CAS-Carrera, in partnership with CH+A organized orientations and ongoing trainings to ensure that (new) staff were appropriately acclimated to the model's core principles and philosophy and were sufficiently trained to be able to execute the model as prescribed by their roles (p. 9).

Moreover, Philiber, Philiber, & Brown (2015) described facilitators implementing the TOP® Pacific Northwest viewed some of the intervention content as non-relevant and asserted,

> In fact, many of the TOP® Facilitators did not use the sexuality education lessons included in TOP® since some of their schools did not permit this material to be included or the Facilitators thought that the sexuality information in the TOP® curriculum was incomplete and outdated (p. 20).

Coyle, Potter, Glassman, McDade-Montez, & Unti (2015) evaluated the It's Your Game (IYG) South Carolina TPP program and provided unique findings aligned with CFIR Domain 5, sub-construct 5.2.4 (External Change Agents). Coyle, Potter, Glassman, McDade-Montez, & Unti (2015) described,

> As part of Teen Pregnancy Prevention Month in May 2012, the former Miss SC visited an equal number of intervention and comparison schools to do a group presentations on following you dreams and achieving your goals (p. 40).

This experience from an outside individual supported the IYG messages and program content, and authors of the case report described increased enthusiasm for the TPP program from adolescents following the presentation (Coyle, Potter, Glassman, McDade-Montez, & Unti, 2015).

The last insight drawn from applying the CFIR to the Tier I replication TPP programs was data aligned with Domain I. Intervention, sub-construct 1.4 (Adaptability). Eighty-six percent (n=13) of the Tier I case reports described that implementation organizations and partners viewed the interventions (i.e., programs) as

easily adaptable, tailored, or refined to meet local needs (The Policy & Research Group, 2015a; Coyle et al., 2016; Walker, Inoa, & Coppola, 2016; Seshadri et al., 2015; Crean, Seibold-Simpson, Jambon, & Kreipe, 2015; Daley et al., 2015; Francis, Woodford, & Kelsey, 2015; Philiber, Philiber, & Brown, 2015; Robinson, Kaufman, & Cahill, 2016;; Tucker, & Associates, 2015; Coyle, Potter, Glassman, McDade-Montez, & Unti, 2015; Philiber & Philiber, 2016; The Policy & Research Group, 2015b; Eichner, Salaway, Smith-Jones, & McCall, 2015). While Tier I programs replicated TPP EBI, the intent from OAH was to test program's repeat measures in new settings among new populations which would inherently involve adapting delivery to better accommodate specific needs of the target population (Farb & Margolis, 2016). Evidence presented from Eichner, Salaway, Smith-Jones, & McCall (2015) who evaluated the Seventeen Days online clinic-based TPP program, described the individualized nature of the intervention which allowed for adaptability for each adolescent participant.

Tier II Results. First, like findings from their counter Tier I TPP programs, each Tier II TPP demonstration/innovation program case report (n=14) included data aligned to Domain 2 Organization, sub-construct 2.1 (Needs Assessment) and 2.4 (External Policy & Incentives); Domain 3 Community, sub-construct 3.5.2 (Available Resources); and Domain 5 Process, sub-construct 5.3 (Execute) (Martin, Hill, Nye, & Hollman-Billermeier, 2015; Kissinger et al., 2015; Slater, & Mitschke, 2015; Ruwe, McCloskey, Meyers, Prudent, & Foureau-Dorsinville, 2016; Calise, Chow, & Dore, 2015; Dierschke, Gelfond, Lowe, Schenken, & Plastino, 2015; Abe, Barker, Chan, & Eucogco, 2015; LaChausse, 2015; Advanced Empirical Solutions, 2015; Bull, Schmiege, & Devine,

2015; Carter, Beadnell, & Vankslyke, 2015; Cunningham, van Zyl, & Borders, 2016; Vyas, Wood, Landry, Douglass, & Fallon, 2015; Schwinn et al., 2015). Required per the OAH were policies regulating when, how often, and with what methods Tier II program grantees should report implementation performance measures (Adherence, Quality, Counterfactual, Context) and data (CFIR Domain 2, Organization, sub-construct 2.4 External Policies & Incentives) (Farb & Margolis, 2016) (Appendix E). Abe, Barker, Chan, & Eucogco (2015) who evaluated Pono Choices, Advanced Empirical Solutions (2015) who evaluated Will Power/Won't Power, and Carter, Beadnell, & Vankslyke (2015) who evaluated the Web of Life all reported the OAH policies as helpful to guiding reporting practices. Dierschke, Gelfond, Lowe, Schenken, & Plastino (2015) reported The Need to Know (N2K), San Antonio provided facilitator incentives to encourage collection of participant consent forms, a policy mandated per the OAH TPP program contract, and reported, "All classroom teachers were given $25 Wal-Mart gift cards to thank them for collecting the consent forms that were returned during school hours" (p. 10).

Next, only nine (64%) of the Tier II program case reports included data which illustrated Domain 1, sub-construct 1.4 (Adaptability) (Martin, Hill, Nye, & Hollman-Billermeier, 2015; Slater, & Mitschke, 2015; Ruwe, McCloskey, Meyers, Prudent, & Foureau-Dorsinville, 2016; Calise, Chow, & Dore, 2015; Abe, Barker, Chan, & Eucogco, 2015; Bull, Schmiege, & Devine, 2015; Carter, Beadnell, & Vankslyke, 2015; Cunningham, van Zyl, & Borders, 2016; Schwinn et al., 2015). The Tier II programs supported demonstration/innovative program implementation tailored and designed for

adolescents in specific intervention communities (Farb & Margolis, 2016). Case authors who described culturally relevant programs, Haitian American Responsible Teens (HART) (Ruwe, McCloskey, Meyers, Prudent, & Foureau-Dorsinville, 2016) and Pono Choices (Abe, Barker, Chan, & Eucogco, 2015), described adaptability among program content, facilitator training mechanisms, and implementation in school environments as contributing to increased implementation practice. Abe, Barker, Chan, & Eucogco (2015) reported,

> Pono Choices embeds cultural practices in the curriculum through ‘ohana (family) activities. Students and members of their ‘ohana have the opportunity to construct a wa’a (canoe), braid cordage, and create a lei while reinforcing the messages of teen pregnancy and STI prevention (p. A-3).

The third insight from applying the CFIR to the Tier II case reports was a lack of data describing Domain 3 Community and the associated sub-constructs. Only four programs (29%) presented data in the evaluation case report detailing sub-construct 3.2 (Organization Communications) when describing implementation practices (Kissinger et al., 2015; Calise, Chow, & Dore, 2015; Dierschke, Gelfond, Lowe, Schenken, & Plastino, 2015; Advanced Empirical Solutions, 2015).Vyas, Wood, Landry, Douglass, & Fallon (2015) who evaluated Be Yourself/Se Tu Mismo, Calise, Chow, & Dore (2015) who evaluated The Healthy Futures Teen Pregnancy Prevention Program, Dierschke, Gelfond, Lowe, Schenken, & Plastino (2015) who evaluated Need to Know (N2K), and Advanced Empirical Solutions (2015) who evaluated Will Power/Won’t Power discussed the nature and/or quality of social networks which served to improve program

implementation over time. Calise, Chow, & Dore (2015), authors of The Healthy Futures Teen Pregnancy Prevention Program provided evidence of sub-construct 3.2 (Organization Communication) related to monitoring staff turnover and stated,

> Healthy Futures Executive Director maintained close communications with district-level and school-level staff in participating districts to monitor staff turnover. Healthy Futures Executive Director reported findings to the evaluation team to document in the Tracking Database (p. 33).

Lastly, Tier II programs included data describing Domain 5 Process, sub-construct 5.4 (Reflecting and Evaluating). Nine case reports (64%) recorded reflection about *what worked* and *didn't work* during the implementation period (Martin, Hill, Nye, & Hollman-Billermeier, 2015; Kissinger et al., 2015; Slater, & Mitschke, 2015; Calise, Chow, & Dore, 2015; Dierschke, Gelfond, Lowe, Schenken, & Plastino, 2015; Abe, Barker, Chan, & Eucogco, 2015; LaChausse, 2015; Cunningham, van Zyl, & Borders, 2016; Vyas, Wood, Landry, Douglass, & Fallon, 2015; Schwinn et al., 2015). Authors of the Love Notes and Reducing the Risk program case report, Cunningham, van Zyl, & Borders, 2016, shared insights from facilitator meeting notes and team debriefs which stated,

> A future study should compare implementation over a longer period versus implementation over a shorter period (with and without intensive boosters every one to three months) to see which delivery method works best to impact not only delays in sexual initiation (p. 28-29).

In reflecting on program implementation (CFIR Domain 5 process, sub-construct 5.4 Reflecting & Evaluating) Slater & Mitschke (2015) who evaluated the Crossroads Teen Pregnancy Prevention Program in Arlington, Texas reported,

> Interviews with program staff and the Pregnancy Related Services coordinator did not reveal any substantial external events affecting implementation on an ongoing basis. One of the cohorts did experience severe weather preventing youth from participating in the outdoor experiential activities; however, the staff was able to modify the programming in order to continue to implement the curriculum and cover all core components (p. 24).

OAH Performance Measure Results

The OAH implementation performance measures included Adherence, Quality, Counterfactual (Control), and Context. These reporting elements produced data for fidelity, dosage, reach and retention, partnerships, training, and dissemination of the Tier I and II TPP programs. Results from three of the four reporting measurements are presented below: Adherence, Quality, and Context. The study's research questions pertained only to the implementation among the TPP programs and thus was not concerned with the experiences and/or programs of non-participating adolescents. As such, data from the Counterfactual (Control) performance measure is not included in the results of this study. Table 4 contains Tier I and II program Adherence results, Table 5 contains Tier I and II program Quality result, and Table 6 contains Tier I and II program Context results.

Table 4. Office of Adolescent Health (OAH) Implementation Element, Adherence Results

		OAH Implementation Element: Adherence (Questions 1-4)			
	Program Title	Q1. How often were sessions offered? How many were offered?	Q2. What and how much was received?	Q3. What content was delivered to youth?	Q4. Who delivered material to youth?
		Result(s)	**Result(s)**	**Result(s)**	**Result(s)**
(Tier I) TPP EBI Replication	Becoming a Responsible Teen (BART), Louisiana Public Health Institute; New Orleans, Louisiana	All eight sessions were offered to 41 of the 43 classes receiving BART; two classes were not offered in session 7, and two were not offered in session 8	On average, participants assigned to BART received between six and seven (mean = 6.3) of the eight intended programming sessions. 40% attended all sessions.	BART is an out-of-school, group-level, cognitive behavioral and skills training sexual education course designed to reduce African American adolescents' risk for contracting HIV.	Teams consisting of two health educators (one male and one female) were responsible for leading the BART
	Children's Aid Society/Carrera Adolescent Pregnancy Prevention Program (CAS), Morehouse School of Medicine; Atlanta, Georgia	All three intervention sites operated 155 days each program year (100% adherence.) All sites implemented all program sessions as intended (i.e., there was 100% implementation of each component in each site in each year.	During the first program year, 41-51% of participants across the three intervention sites received 75% of the program in days. During year two, the percent of participants receiving 75% dropped to a low of 4% at one site and 24% and 28% at the other two sites. In the third year, 12-31% of participants across the intervention sites received 75% of the program.	All three intervention sites implemented 100% of the content and activities for FSLE, Job Club, Power Group, Lifetime Sports, and Self Expression every program year.	Implemented with 100% adherence to the prescribed staffing model
	Children's Aid Society/Carrera Adolescent Pregnancy Prevention Program (CAS), Children's Home & Aid Society of Illinois; Chicago, Illinois.	During the first program year, 41-51% of participants across the three intervention sites (metropolitan, 50%; micropolitan, 41%; rural, 51%) received 75% of the program days. During year two, the percentage of participants receiving 75% dropped to a low of 4% at one site and averaged 26% at the other two sites. Attendance increased slightly in the third year with 12-31% of participants across sites receiving 75% of the program.	Attendance data show that only 12% of program youth attended at least 75% of scheduled sessions (the initial goal). The overall percentage of scheduled sessions attended was 42%, far lower than original expectations.	The CAS-Carrera program uses a holistic approach to empower youth, to help them develop personal goals and the desire for a productive future, to develop their sexual literacy, and to educate them about the consequences of sexual activity	CAS Facilitators
	It's Your Game: Keep it Real (IYG), University of Texas Health Science Center at Houston; Houston, Texas	7th grade classes with complete log data (126 classes, or approximately 87% of classes implemented): facilitators delivered 10.4 out of 12 sessions. 8th grade classes with complete log data (133 classes, or approximately 98% of classes implemented): facilitators delivered 11 of 12 sessions (97.4% of the curriculum) on average.	The average duration of each session was 45 minutes during 7th grade and 45 minutes during 8th grade, equating to an average total of 468 minutes and 495 minutes of programming in each grade, respectively. Teachers delivered an average of 95.3% of the IYG activities within 7th grade lessons (64 of 70 possible activities) and 93% in 8th grade lessons (62 of 67 possible activities).	It's Your Game...Keep It Real is a two-year intervention that consists of 24 50-minute lessons, 12 delivered in 7th grade and 12 delivered in 8th grade.	IYG facilitators
	It's Your Game: Keep it Real (IYG), South Carolina Campaign To Prevent Teen Pregnancy; Columbia, South Carolina	The average frequency of sessions was every 3.4 days during 7th grade (range = every 2 to 10.6 days) and every 4.1 days during 8th grade (range = every 1.3 to 14.2 days). Teachers delivered an average of 98% of the IYG activities within lessons across both years of the study (67 of 68 possible activities).	In 7th grade, students attended an average of 11.3 sessions (94% of 12 lessons), and 1% of students did not attend any sessions. In 8th grade, students attended an average of 10.2 sessions, or 84% of 12 lessons, and 11% of students did not attend any sessions.	It's Your Game...Keep It Real is a two-year intervention that consists of 24 50-minute lessons, 12 delivered in 7th grade and 12 delivered in 8th grade.	17 IYG facilitators implemented 7th grade 15 implemented it in the 8th grade
	Promoting Health Among Teens! Abstinence-Only, Program Reach, Inc.; Yonkers, New York	Coverage of the content was high (92%), there were two modules (5 and 8) for which about two thirds of the content was not taught because the allotted time for the activities	Approximately 85% of youth attended both Saturdays, and 82% received at least 75% of the content	PHAT-AO is an eight-hour intervention consisting of eight one-hour modules.	24 facilitators were hired over the course of implementation

Table 4. Continued

Program Title	OAH Implementation Element: Adherence (Questions 1-4)			
	Q1. How often were sessions offered? How many were offered?	Q2. What and how much was received?	Q3. What content was delivered to youth?	Q4. Who delivered material to youth?
	Result(s)	**Result(s)**	**Result(s)**	**Result(s)**
Teen Outreach Program (TOP®), Chicago Public Schools; Chicago, Illinois	A total of 7,057 TOP® sessions were intended and of these, 77% (5,416 sessions) were actually implemented. On average, sessions were 50 minutes in length. According to Wyman, expected lesson time range between 40 to 50 minutes. An average of 94% of clubs met each week. The majority of clubs (98%) met the TOP® requirement of a minimum of 25 sessions.	Students attended 87% of TOP® sessions in their clubs.	TOP® is a youth development program which include lessons targeting five content areas: Values, Goals, Communication, Relationships, and Sexual Health and included engagement in a CSL project chosen by the peer group.	TOP® certified facilitator
Teen Outreach Program (TOP®), City of Rochester Bureau of Youth Services; Rochester, New York	Youth were offered a minimum of 25 weekly sessions with an average of 27.6 sessions.	Activities were completed as per the Changing Scenes curriculum 95.6% of the time.	TOP® is a youth development program designed to reduce teenage pregnancy and increase school success by helping youth develop a positive self-image, life management skills, and optimistic yet realistic expectations.	TOP® certified facilitator
Teen Outreach Program (TOP®), Florida Department of Health; Tallahassee, Florida	In the 13 schools receiving the intervention, TOP® was implemented in 70 individual classes. TOP® facilitators implemented sessions throughout the school year in each of the 70 classes, with 51 (73%) classes receiving at least 25 sessions as prescribed (range: 23-57 sessions).	Classes weekly, as prescribed; 29 classes (41%) received more than 1 session per week at least once. Sessions ranged from 30-150 minutes; the average duration was 58 minutes. TOP® facilitators reported completing 98 CSL projects; each class did 1-4 projects.	TOP® is a youth development program designed to reduce teenage pregnancy and increase school success by helping youth develop a positive self-image, life management skills, and optimistic yet realistic expectations.	TOP® certified facilitator
Teen Outreach Program (TOP®), Hennepin County Human Services and Public Health Department; Minneapolis, Minnesota	Across TOP® classes, students were offered a minimum of 25 weekly sessions with a median of 29 sessions. The median class period length was 50 minutes, and the average duration of TOP® was 8.2 months.	Weekly session attendance was associated with completion of CSL hours; of those with at least 20 hours of CSL, 89 percent also had attended at least 25 weekly sessions	TOP® is a youth development and service learning program designed to reduce teenage pregnancy and increase school success by helping youth develop a positive self-image, life management skills, and realistic goals.	TOP® certified facilitator
Teen Outreach Program (TOP®), Louisiana DHH Office of Public Health; New Orleans, Louisiana	All planned activities were completed for 98% of sessions.	Youth assigned to TOP® clubs attended a mean of 8.2 sessions, a median of 4.5 sessions, and a mode of 0 sessions.	TOP® is designed to provide components that lead to a decrease in teen pregnancy among participants along with other decreases in other undesired behaviors.	TOP® certified facilitator
Teen Outreach Program (TOP®), Planned Parenthood of the Great Northwest; Seattle, Washington	Across the 230 TOP® clubs a median of 30 weekly sessions were delivered with a median length of 55 minutes.	71% of curriculum activities and 85% of CSL activities were delivered. Observers concurred that 95% of the curriculum sessions and 91% of the CSL sessions were delivered as planned.	TOP® is designed to provide components that lead to a decrease in teen pregnancy among participants along with other decreases in other undesired behaviors.	18 TOP® certified facilitator
Teen Outreach Program (TOP®), The Women's Clinic of Kansas City; Independence, Missouri	Across the 51 TOP® clubs a median of 31 weekly sessions were delivered. Each TWC club offered 24 hours (median) of CSL opportunities.	The full dose of TOP® was received by eight (2%) of the program students in the long-term analytic sample. Facilitators delivered 20 curriculum lessons and 24 hours of CSL across a total of 31 sessions.	TOP® is a youth development program designed to reduce teenage pregnancy and increase school success by helping youth develop a positive self-image, life management skills, and optimistic yet realistic expectations.	TOP® Facilitators
Safer Sex; Louisiana Public Health Institute; New Orleans, Louisiana	Overall, 100% of intended initial, one-, three-, and six-month booster Safer Sex Intervention sessions were offered to participants assigned to the treatment group.	The majority of participants (69%) received the initial session within the intended time frame, but the session lasted more than 50 minutes for about one quarter (26%) of them.		A total of 11 health educators facilitated both the treatment intervention

Table 4. Continued

		OAH Implementation Element: Adherence (Questions 1-4)			
	Program Title	Q1. How often were sessions offered? How many were offered?	Q1. How often were sessions offered? How many were offered?	Q1. How often were sessions offered? How many were offered?	Q1. How often were sessions offered? How many were offered?
		Result(s)	**Result(s)**	**Result(s)**	**Result(s)**
	Seventeen Days, Carnegie Mellon University; Pittsburgh, Pennsylvania	Full dosage of 2.5 hours of programming offered to all participants; intervention was available to participants for 6 months of unlimited access	61% of participants completed the entire core material.	Seventeen Days lasts approximately 35 minutes and consists of one character (Jessica) narrating introduction to the concepts (of choice in sexual situations and cognitive rehearsal of safe choices), a lesson on condom procedure and efficacy, and a vignette on sexual negotiation, including choices and cognitive rehearsal	Online delivery, required no facilitator
(Tier II) Demonstration/Innovation TPP Programs	Alaska Promoting Health Among Teens, Comprehensive Abstinence and Safer Sex Practices (AKPHAT Comp), State of Alaska, Department of Health and Social Services; Anchorage, Alaska	Attendance records show that all youth assigned to AKPHAT attended at least one module. About two-thirds (68%) attended all 12 modules, 79% attended 75% or more, and 84% and 82% attended modules 10 and 12, respectively.	Overall, 90% of the modules were completed, either as designed or with adaptations.	The goal of AKPHAT was to provide programming in Anchorage and rural areas across the south-central and western parts of the state. AKPHAT in Anchorage reached local youth, as well as many who migrate from rural Alaska and often end up homeless.	Peer educators implemented AKPHAT with 31 cohorts.
	Be yoU, Talented, Informed, Fearless, Uncompromised, and Loved (BUtiful)-- Adaptation of SiHLE, Tulane University School of Public Health and Tropical Medicine; New Orleans, Louisiana	Eight sessions were available on both the BUtiful and DIVAS websites. Participants of BUtiful completed a mean of 5.1 sessions; 58.5% completed 6 or more sessions, and 55.7% completed all eight sessions.	The percentage of BUtiful participants who engaged in at least one of the 48 activities on the website was 57.6%. The mean number of activities completed by participants in BUtiful was 26.7. m	DIVAS is presented via video, text, interactive activities, and questions and answers (Q&A); it has 40 activities that are found throughout the eight sessions. Completion of the activities within a session are optional and will not affect the ability to move forward in the session.	Online delivery, required no facilitator.
	Be Yourself/Se Tu Mismo, George Washington University; Washington, DC	For the 6-month post-program sample, all intended sessions were offered to both intervention and comparison groups. The program dosage for the curriculum component was 24.17 program sessions (there were 25 sessions for cohort 1 and then 19 sessions for cohorts 2- 6), and 12 program sessions for the comparison group. Further, 93% (intervention) and 90% (comparison) of activities were completed. The program sessions were implemented as planned and with fidelity.	Less than half of youth attended greater than 75% of sessions. For the retreat, 64.7% (n=325) of intervention youth (n=502) attended the retreat. Thirty-seven percent (n=336) of youth in the analytic sample signed up for Facebook, and 53% (n=482) joined the text message platform. In total, 72 Facebook pages were created for each of the 72 cohorts.	The curriculum comprised a neutral module: Building Your Team, and 5 intervention modules, which included 19 sessions entitled You, Your Pit and Your Community; You and Your Emotions; You and Your Future; You and Your Relationships; and You and Your Goals.	Online delivery, required no facilitator.
	Crossroads, Arlington Independent School District; Arlington, Texas	Cohort 1 received 1.75 hours out of 21 hours and Cohort 2 received 14 hours out of 18.75 hours.	Almost 71% of youth attended 75% or more of the intervention, while 13.6% of the sample did not receive any portion of intervention. All 16 intended activities were offered per session resulting in an average of 13.06 (s.d. 6.06) activities attended by participants.	Crossroads on reducing risky sexual behaviors among older adolescent youth classified as high risk for dropping out of high school.	Program Facilitators
	Haitian American Responsible Teens (HART), Boston Medical Center; Boston, Massachusetts	We found that 97.3% of session activities that were planned had been completed within the allocated time.	Median attendance was 70%, and 59% of the class maintained more than 75% attendance.	"Haitian-American Responsible Teen" (HART) program in 9 public high schools and 2 community settings in the greater Boston area (Suffolk and Middlesex counties).	Two facilitators at each program site

Table 4. Continued

Program Title	OAH Implementation Element: Adherence (Questions 1-4)			
	Q1. How often were sessions offered? How many were offered?	Q1. How often were sessions offered? How many were offered?	Q1. How often were sessions offered? How many were offered?	Q1. How often were sessions offered? How many were offered?
	Result(s)	**Result(s)**	**Result(s)**	**Result(s)**
Healthy Futures, Black Ministerial Alliance of Greater Boston; Boston, Massachusetts	According to the daily fidelity checklists completed by HF health educators, HF delivered the Nu-CULTURE program with high fidelity (more than 80% activities were implemented as prescribed) in the majority of treatment schools across all three years of implementation.	The average student attendance rate over the intended 24 sessions was 76%.7 The average student attendance rate over the intended sessions was highest in 6th grade (86%) but declined in 7th and 8th grades (73% and 68%, respectively). According to school schedules, the average program duration (intended to be 50 minutes) was 51 minutes in 6th grade, 53 minutes in 7th grade, and 49 minutes in 8th grade.	The main HF component is Nu-CULTURE, a classroom-based relationship education curriculum, offered by health educators for eight 50-minute sessions each in 6th, 7th, and 8th grade.	Trained Program Facilitators
Multimedia Circle of Life (mCOL), University of Colorado Denver; Denver, Colorado	Fifty percent (4/8) of the mCOL units delivered the full intervention. Across all units, 80 activities were delivered, which equaled 71% of the total number of activities possible (total number = 8 units x 14 lessons/session=112).	Forty-five percent (n=38) completed 70% (5 of 7 chapters) of the online curriculum. Of these, 92% (n=35) completed all the online lessons. Twenty-seven percent (n=23) completed at least 70% (5 of 7 sessions) of the class lessons, and, of these, 91% (n=21) of youth completed all class lessons. Fifty-five percent (n= 46) of youth in the intervention group (mCOL) did not receive any portion of the intervention.	mCOL is an multimedia format for ATAM youth ages 10-12 years and includes updated, expanded, and medically reviewed content on teen pregnancy prevention, sexually transmitted diseases (STDs), and hepatitis C.	Online delivery
Need to Know (N2K), University of Texas Health Science Center at San Antonio; San Antonio, Texas	Health educators reported covering 98.7% of topics in 9th grade, 95.7% of topics in 10th grade, and 99.1% of topics in 11th grade.	The average dosage received in the 9th grade was 95%, while the 10th and 11th grade mean dosage was 87%.	N2K is based on a framework of positive youth development intended to delay sexual initiation and reduce the rate of teenage pregnancy.	Program Staff (Health Educators)
Pono Choices, University of Hawaii; Honolulu, Hawaii	Ninety-four percent of students completed at least 75 percent of the curriculum, and the average dosage was 94 percent across all three semester cohorts.	Facilitator logs provide data on activities completed for 100% of the sessions. Observers' logs for show a 98% agreement with Facilitator logs.	The goal of Pono Choices is to equip middle school youth with the knowledge and skills necessary to reduce their risk of unintended pregnancy and STIs by providing medically accurate information with instructional strategies that emphasize the Hawaiian host culture.	Teachers delivering the curriculum
Positive Prevention PLUS, San Bernardino Country Superintendent of Schools; San Bernardino, California	There were 1,353 lessons offered in the program (123 sections of the 11 lesson program). Each lesson was approximately 40 minutes in length. The average weekly frequency was 455 lessons within the 18 school day implementation period.	The average number of lessons attended by each student was 10.01 (SD = 1.63). Ninety-one percent of the entire program was attended (21,418 attended lessons of the 23,529 possible lessons (2,139 students with 11 lessons each)).	Positive Prevention PLUS, an 11-lesson school-based teen pregnancy prevention (TPP) program, was developed based on the existing literature surrounding school-based prevention programs that use experiential, interactive activities to emphasize abstinence and risk reduction techniques.	36 teachers were trained in the program by project staff.

Table 4. Continued

Program Title	OAH Implementation Element: Adherence (Questions 1-4)			
	Q1. How often were sessions offered? How many were offered?	Q1. How often were sessions offered? How many were offered?	Q1. How often were sessions offered? How many were offered?	Q1. How often were sessions offered? How many were offered?
	Result(s)	**Result(s)**	**Result(s)**	**Result(s)**
Will Power/Won't Power, Volunteers of America, Greater Los Angeles; Los Angeles, California	11 WPWP sessions and 10 EESS sessions implemented during each cohort, Program Specialists taught 714 sessions (374 intervention and 340 counterfactual) over the grant period.	Cohort 1 data indicated that 70.5% (N = 44) of girls in the intervention group completed 8 or more sessions of the program. In Cohort 2, 66.7% (N = 108) of the girls in the intervention group completed 8 or more sessions. Cohort 3, 77.1% (N = 144) of the girls in the intervention completed 8 or more sessions. Finally, in Cohort 4, 76.9% (N = 104) of the girls in the intervention group and 66.7% (N = 105) of the girls in the counterfactual group completed more than 8 sessions.	Girls Inc. of Greater Los Angeles (a Volunteers of America Los Angeles [VOALA] program) implemented an innovative afterschool program designed to prevent teenage pregnancy aligned with the Office of Adolescent Health/Family Youth Services Bureau Tier 2 grant goals.	Program Facilitators
Reducing the Risk and Love Notes, University of Louisville; Louisville, Kentucky	In LN, 91% of activities in the curriculum were fully covered, and 4% were shortened or lengthened. In RtR, 93% of planned program activities were fully covered and 4.5% were partially covered.	Ninety-three percent of youth assigned to RtR participated both day 1 and day 2, 94% of youth assigned to LN participated all of day 1 and day 2, and 98% of youth assigned to PoW participated all of day 1 and day 2.	LN was developed to educate participants about healthy relationships, including issues of decision-making, communication and conflict resolution, and overall safety, including the prevention of pregnancy and sexually transmitted disease	Trained facilitators delivered Loves Notes and Reducing the Risk.
Teen Outreach Program Plus Youth All Engaged (text messaging), Denver Health and Hospital Authority; Denver, Colorado	In total, 40,006 text messages were sent to 221 program participants during the first two years. Of these, 16,501 messages (41%) were bi-directional messages that requested a response (e.g., quizzes, polls, etc.). The remaining 23,505 messages were unidirectional and did not request a response (e.g., facts, resources, auto-reply messages). Each participant was sent an average of 74.6 messages. We received 2,764 responses to the 16,501 bi-directional messages (16.8%).	YAE participants attended a mean of 10.9±8.8 sessions (42% of those offered) with a mean of 10.8±13.9 community service learning hours and TOP® participants a mean of 13.0±8.9 sessions (50% of those offered) and 12.5±12.9 community service learning hours.	In addition to TOP® ®, the intervention group receive the YAE text-messaging component that consists messages reinforcing specific topics covered each week in the TOP® sessions and offered additional information and resources related to the topics covered in TOP® each week.	Text Message delivery, did not require facilitator
Web of Life, National Indian Youth Leadership Project; Gallup, New Mexico	A total of 2,639 activities within 691 program sessions were offered over the three-year study period with an overall completion rate of 89%. Completion rates increased from 84% in Year 1, to 87% in Year 2, to 97% in Year 3.	On average, 88% of students attended the school-based component. 76% participated in at least one of the three multiday events.	WOL is adapted from NIYLP's Project Venture, an evidence-based program designed to prevent substance abuse and promote resilience and mental health among American Indian adolescents.	Program Facilitators

Table 5. Office of Adolescent Health (OAH) Implementation Element, Quality Results

		OAH Implementation Element: Quality (Questions 1 & 2)	
	Program Title	Q1. Quality of Staff-Participant Interaction	Q2. Quality of Youth Engagement with Program
		Result(s)	**Result(s)**
(Tier I) TPP EBI Replication	Becoming a Responsible Teen (BART), Louisiana Public Health Institute; New Orleans, Louisiana	Of the 80 BART sessions observed extent of participants' understanding and was scored as moderate or good in 70% of the assessed sessions. The overall quality of the program session was scored as good or excellent for 65% of the assessed sessions.	Extent of group members' participation was scored as moderate or active for 65% of the assessed 20 sessions.
	Children's Aid Society/Carrera Adolescent Pregnancy Prevention Program (CAS), Morehouse School of Medicine; Atlanta, Georgia	Out of 69 component sessions observed equally across the three Carrera sites, on the program observation form, 53% of staff received a score of 5/5 on a 1-5 point-scale measuring "staff rapport with students," 34% received a score of 4/5, 8% received a score of 3/5, and 5% received a score of 2/5.	On the item "participant participated in discussions and activities," 47% of staff received a score of 5/5, 34% received a score of 4/5, 14% received a score of 3/5, 3% received a score of 2/5, and 2% received a score of 1/5.
	Children's Aid Society/Carrera Adolescent Pregnancy Prevention Program (CAS), Children's Home & Aid Society of Illinois; Chicago, Illinois	Using observation data on program quality (n=726), 74% of the ratings were 4s or 5s (26% of the ratings were 1s, 2s, or 3s).	82% of youth participated regularly in program session.
	It's Your Game: Keep it Real (IYG), University of Texas Health Science Center at Houston; Houston, Texas	On ratings of facilitator rapport with students, 87.5% of the 7th grade ratings were a 4 or 5.	Both students and teachers reported positive reactions to the program, and most teachers expressed a desire to continue the program.
	It's Your Game: Keep it Real (IYG), South Carolina Campaign To Prevent Teen Pregnancy; Columbia, South Carolina	On ratings of facilitator rapport with students, 87.5% of the 7th grade ratings were a 4 or 5.	Among observations during which students asked questions (81% of observations), 90% included ratings of a 4 or 5 on facilitators' ability to address student questions.
	Promoting Health Among Teens! Abstinence-Only, Program Reach, Inc.; Yonkers, New York	In approximately 90% of all the modules observed for the treatment group, facilitators received a score of 4 or 5 out of 5 for staff-participant interactions. 89% of youth in the intervention group stated that they liked their facilitators and 83% noted that their facilitators showed respect for them.	Youth self-reporting on their level of engagement suggest that most believed that they were able to get into the group activities and felt comfortable talking and sharing their ideas.
	Teen Outreach Program (TOP®), Chicago Public Schools; Chicago, Illinois	The quality of staff-participant interaction as measured by the overall quality item was scored above average or higher in 56% of sessions.	55% of sessions received the highest rating in which 75% or more of the students participated. Of these, 21% were rated as excellent, where youth were observed doing activities rather than talking about them.
	Teen Outreach Program (TOP®), City of Rochester Bureau of Youth Services; Rochester, New York	The Changing Scenes® curriculum was provided with high quality as noted by facilitators and observers alike. There was greater than 90% agreement with 5 of the 8 items measured, and greater than 80% agreement with the remaining 3 measures.	Data on level of youth engagement in the program was no provided in the evaluation report.
	Teen Outreach Program (TOP®), Florida Department of Health; Tallahassee, Florida	The overall quality of staff-participant interactions was 3.90 out of 5 (n=21, SD=0.66). The overall quality of staff-participant interactions, as reported by youth, was assessed as 4.95 out of 7 (n=1,280, SD=1.63), and the majority of youth perceived that their TOP® facilitators "care about me" (78%, n=1,259), "understand me" (76%, n=1,245) and "support and accept me" (80%, n=1,258).	The observed overall quality of youth engagement with the program was assessed as 2.58 out of 5 (n=24, SD=.85). The majority of youth affirmed that during their TOP® CSL project they: learned new skills (69%, n=1,220), helped plan their service project (66%, n=1,202), learned how to deal with challenges (69%, n=1,221), enjoyed their community service (71%, n=1,207), and 72% (n=1,208) reported that the CSL project they did helped them make a positive difference in the lives of others.
	Teen Outreach Program (TOP®), Hennepin County Human Services and Public Health Department; Minneapolis, Minnesota	Student participants perceived high-quality interactions with staff and high engagement with the program.	Student participants perceived high-quality interactions with staff and high engagement with the program.
	Teen Outreach Program (TOP®), Louisiana DHH Office of Public Health; New Orleans, Louisiana	64% of treatment participants, strongly agreed that the facilitator was caring, and 94% strongly agreed that they were understanding. In addition, 79% strongly agreed that the class was a safe, values-neutral environment.	During those observations evaluators scored facilitators high for both facilitator-participant relationships and participant engagement.
	Teen Outreach Program (TOP®), Planned Parenthood of the Great Northwest; Seattle, Washington	92% of program youth were in agreement that their Facilitators were caring and understanding and 90% agreed that their TOP® club was a safe and values-neutral environment.	TOP® Facilitators and observers rated youth engagement in participatory activities to be very high (to a great extent) in 91% of the curriculum sessions and 95% of the CSL sessions.

Table 5. Continued

	Program Title	OAH Implementation Element: Quality (Questions 1 & 2)	
		Q1. Quality of Staff-Participant Interaction	Q1. Quality of Staff-Participant Interaction
		Result(s)	**Result(s)**
Tier II Demonstration/Innovation TPP Programs	Teen Outreach Program (TOP®), The Women's Clinic of Kansas City; Independence, Missouri	94% of observations of the program delivery rated the rapport and communication between Facilitators and students as good to excellent.	Observers rated youth engagement in participatory activities to be very high (to a great extent) in 97% of the sessions.
	Safer Sex; Louisiana Public Health Institute; New Orleans, Louisiana	Overall, data on quality of staff-participant interactions during Safer Sex Intervention sessions are very limited, and both the number of observations and results vary considerably by study site; however, overall quality of the program session was scored as good or excellent for 61% of assessed sessions.	Extent of group members' participation was scored as moderate or active for 87% of assessed sessions.
	Seventeen Days, Carnegie Mellon University; Pittsburgh, Pennsylvania	Online delivery method.	Online delivery method.
	Alaska Promoting Health Among Teens, Comprehensive Abstinence and Safer Sex Practices (AKPHAT Comp), State of Alaska, Department of Health and Social Services; Anchorage, Alaska	Peer educators averaged 4.2 out of 5 on rapport and communication with participants' on a scale from 1 (doesn't remember names, doesn't connect with participants, acts distant) to 5 (gets participants very excited, very friendly, uses people's names when appropriate, seems to understand the community and its needs).	Peer educators averaged 3.5 out of 4 on participant engagement with the program on a scale from 1 (not at all) to 4 (very much). The second index measured participant comfort with the program, using a scale from 1 (very uncomfortable) to 5 (very comfortable). Participants rated their comfort with the program as 4.1.
	Be yoU, Talented, Informed, Fearless, Uncompromised, and Loved (BUtiful)--Adaptation of SiHLE, Tulane University School of Public Health and Tropical Medicine; New Orleans, Louisiana	Online delivery method.	Online delivery method.
	Be Yourself/Se Tu Mismo, George Washington University; Washington, DC	The staff scale (4.58 for intervention; $p < .001$) and program satisfaction scale (4.58 for intervention; $p < .001$) rated by youth yielded high scores.	However, youth in the intervention group were more interested (4.45 and 3.97, $p < .001$) and engaged (4.43 and 3.96, $p < .001$) in the program than youth in the comparison group.
	Crossroads, Arlington Independent School District; Arlington, Texas	All of the observations were rated at a 4 or higher, demonstrating "excellent" levels of rapport and communication between staff and youth. All were rated at a score of 5 ("excellent") regarding the ability of the facilitator to effectively address concerns and questions from youth.	Nearly all (96.2%) of the observations were rated at a 4 or higher, demonstrating "active participation" among youth during discussions and activities.
	Haitian American Responsible Teens (HART), Boston Medical Center; Boston, Massachusetts	We found the overall observed quality to be 4 out of 5 (highest value) across all 31 class observations. None of the observed classes had an overall quality rating (across the 7 quality domains) that was below average.	Percent of student engagement in class activities and discussion was not included in final report.
	Healthy Futures, Black Ministerial Alliance of Greater Boston; Boston, Massachusetts	Results from the observations with 6th grade recorded 4.7/5.0 for facilitator's rapport and communication with participations; 7th average of 4.8/5.0 and; 8th grade scores of 4.7/5.0 describing rapport between facilitators and participants.	Youth actively engaged in 90% of the observed sessions in 6th grade, 100% of the observed sessions in 7th grade, and 95% of the observed sessions in the 8th grade.
	Multimedia Circle of Life (mCOL), University of Colorado Denver; Denver, Colorado	The average score for overall quality was 4.5/5.	The average score for youth engagement was 4.25/5 for question #7: "Rate the overall quality of the program session" (scale: 1=poor to 5=excellent).
	Need to Know (N2K), University of Texas Health Science Center at San Antonio; San Antonio, Texas	The average percentage of interactions over the three years that received a 4 or a 5 out of 5 points on a five-point scale were: 99.6% for 'Knowledge of Program'; 98.3% for 'Level of Enthusiasm'; 99.1% for 'Poise and Confidence'; 99.6% for 'Rapport with Students'; and 99.7% for 'Effectively Addressed Questions'.	Percent of student engagement in class activities and discussion was not included in final report.
	Pono Choices, University of Hawaii; Honolulu, Hawaii	The average overall rating across the 11 measures of quality of the delivery of the curriculum was 4.27 on a scale of 1-5, where 5 is Excellent.	The average student engagement rating was 4.61 on a scale of 1-5, where 5 is Excellent. Across all three semesters, the percentage of lessons with a score of 4.0 or higher was 86 percent.

Table 5. Continued

Program Title	OAH Implementation Element: Quality (Questions 1 & 2)	
	Q1. Quality of Staff-Participant Interaction	Q1. Quality of Staff-Participant Interaction
	Result(s)	**Result(s)**
Positive Prevention PLUS, San Bernardino Country Superintendent of Schools; San Bernardino, California	Twenty-six classroom lesson observations were conducted. An average score of 4 or greater was considered a high quality observation. Seventy-three percent (73%) of the observed lessons received a high quality observation	Sixty-five percent of the observed sessions were rated with high student engagement (17 of the 26 observed sessions).
Will Power/Won't Power, Volunteers of America, Greater Los Angeles; Los Angeles, California	79% of the observed staff-participant interactions were considered to be of higher quality (a rating of 4 or 5, out of 5) and only 21% of the observed staff-participant interactions had rating indicating very low engagement (2 of 5) or moderate engagement (3 of 5)	87% of the girls were considered highly engaged (a rating of 4 or 5, out of 5) and 13% being rated as having very low engagement (2 of 5) or moderate engagement (3 of 5).
Reducing the Risk and Love Notes, University of Louisville; Louisville, Kentucky	Observers rated the quality of delivery of LN with a mean of 47.7 (out of 55, where 55 represents the highest quality) and observers rated the quality of delivery of RtR with a mean of 51.5.	During 92.5% of the activities most youth were rated as listening; for 7% of activities some youth seemed to be listening during LN. For RtR, during 95% of activities most youth were listening; for 4% of activities some youth seemed to be listening.
Teen Outreach Program Plus Youth All Engaged (text messaging), Denver Health and Hospital Authority; Denver, Colorado	During the 1st observations of each year, TOP® facilitators would score between 3-4 on a 5-point scale (fidelity & quality assessments); Final year observation they were scoring between 4-5, showing steady improvement and positive changes throughout the year.	"Facilitators and observers reporting activity and engagement were very high" (pg. 47).
Web of Life, National Indian Youth Leadership Project; Gallup, New Mexico	Observer ratings averaged 4.9 out of 5.0, where the higher the score the higher the quality. The lowest rating (4.5) was assigned to the item related to how well facilitators kept track of time	Percent of student engagement in class activities and discussion was not included in final report.

Table 6. Office of Adolescent Health (OAH) Implementation Element, Context Results

		OAH Implementation Element: Context (Questions 1 - 3)		
	Program Title	Q1. Other TPP programming available or offered to study participants (Both intervention & comparison).	Q2. External events affecting implementation	Q3. Substantial unplanned adaption(s)
		Result(s)	**Result(s)**	**Result(s)**
(Tier I) TPP EBI Replication	Becoming a Responsible Teen (BART), Louisiana Public Health Institute; New Orleans, Louisiana	5 other TPP grantees implementing programs within Orleans Parish during the time of BART implementation. A majority of participants reported recent exposure to formal reproductive health education at each data collection point of interest: 56% at baseline (53% BART and 58% Healthy Living), 61% at post-program (62% BART and 60% Healthy Living), and 67% at six- month follow-up (73% BART and 61% Healthy Living).	No external events affecting implementation were reported.	No adaptations were made during the course of the study period.
	Children's Aid Society/Carrera Adolescent Pregnancy Prevention Program (CAS), Morehouse School of Medicine; Atlanta, Georgia	Participants had no other competing program that interfered with impact of the program, since 100% of treatment and comparison respondents reported that they did not participate in similar services.	At the end of implementation year 1, MSM removed one of the site Program Coordinators for administrative reasons and subsequently moved the physical location of the site to within a mile of the original location. Another site moved to a new location because the city "reclaimed" the facility.	No adaptations were made during the course of the study period.
	Children's Aid Society/Carrera Adolescent Pregnancy Prevention Program (CAS), Children's Home & Aid Society of Illinois; Chicago, Illinois	Thirty-eight percent (n=52) of the control group youth said they had received sexuality education and 11% (n=15) said they had been enrolled in the Teen Outreach Program (TOP®).	In summer 2013, two of the study schools closed and moved about one mile away due to district consolidation; Instances of delayed programming due to teacher strikes and/or staff loss/staff turnover; Safety concerns (gang violence) and liability issues	No adaptations were made during the course of the study period.
	It's Your Game: Keep it Real (IYG), University of Texas Health Science Center at Houston; Houston, Texas	Two schools reported providing sexual health education lessons in addition to the regular health, PE, or science curricula at the time comparison students in the study cohort were in 7th and 8th grade.	Individual teachers were allowed to determine the frequency with which sessions were delivered. In three schools, a group of 8th grade students did not receive the curriculum in 7th grade, so they received the 7th grade curricula prior to receiving the 8th grade curricula in 8th grade.	In terms of IYG implementation, no sites reported any substantial unplanned adaptations of the IYG curriculum.
	It's Your Game: Keep it Real (IYG), South Carolina Campaign To Prevent Teen Pregnancy; Columbia, South Carolina	Ten of the 12 comparison schools provided sexual health education at the time comparison students in the study cohort were in 7th grade; 8 of 12 provided it when the students were in 8th grade. None of the comparison schools used an evidence-based curriculum, and only a few used a set text or curriculum.	No external events affecting implementation were reported.	No reported substantial unplanned adaptations of the IYG curriculum.
	Promoting Health Among Teens! Abstinence-Only, Program Reach, Inc.; Yonkers, New York	The schools contributing sample members reported having no other sexual health programs available for students in this age group.	Facilitator turn-over throughout program implementation (rate was slightly less than 50%); Poor classroom management techniques used by Facilitators	No adaptations were made during the course of the study period.
	Teen Outreach Program (TOP®), Chicago Public Schools; Chicago, Illinois	District-wide access to health services in schools, including condom availability and school health centers. Students in the intervention schools may have been exposed to additional curriculum or programming related to sexual health and behavior or youth development.	Prior to the start of cohort one in the 2012-13 school year, 4 comparison and 6 intervention schools were lost due to closures or their principals requesting to withdraw from the study; Weather-related school closures led to TOP® session cancellations; District-level restructuring led to temporary and permanent closure; CPS teacher's union strike.	No adaptations were made during the course of the study period.
	Teen Outreach Program (TOP®), City of Rochester Bureau of Youth Services; Rochester, New York	In total, 18.4% of the youth reported participating in one or more sexual education/prevention or HIV prevention programs (19.2% of WR youth and 17.9% of TOP® youth).	Closure of TOP® sites; Facilitator illness; Insufficient attendance from youth to conduct a session; Holiday breaks.	No adaptations were made during the course of the study period.

Table 6. Continued

Program Title	OAH Implementation Element: Context (Questions 1 - 3)		
	Q2. External events affecting implementation	Q2. External events affecting implementation	Q3. Substantial unplanned adaption(s)
	Result(s)	**Result(s)**	**Result(s)**
Teen Outreach Program (TOP®), Florida Department of Health; Tallahassee, Florida	In 2012-2013 school year, more than half to three-quarters of both intervention and comparison respondents reported receiving information in school (out of TOP® or the comparison class) about abstinence, sexuality, pregnancy prevention and STDs/HIV.	In 1st grant year a total of 17 counties were lost due to various reasons: school board did not approve the study due to schedule constraints or concerns about youth survey questions (n=6), schools with semester-long classes did not fit the requirements of the TOP® fidelity model (n=6); and counties were not allowed to participate in the study due to involvement in the OAH National Evaluation for the Live the Life program (n=5).	No adaptations were made during the course of the study period.
Teen Outreach Program (TOP®), Hennepin County Human Services and Public Health Department; Minneapolis, Minnesota	Twelve schools offered school-wide community service or service learning opportunities unrelated to TOP® ®, and 12 offered at least one of the following four mechanisms for students to access sexual health information (1) presentations and other services by non-school staff, (2) sex education curriculum, (3) puberty/anatomy information, or (4) sexual-health-related elective classes. Nine schools offered both a school-wide community service/service learning opportunity and at least one type of formal sexual health education.	Challenges helping students choose meaningful service projects that could be accomplished without leaving the school in cases where off-site service work was not feasible; Maintaining group continuity over the full school year when some students did not attend school regularly or transferred out during the year.	No adaptations were made during the course of the study period.
Teen Outreach Program (TOP®), Louisiana DHH Office of Public Health; New Orleans, Louisiana	All 6th graders in the city school district are required to take a health class which teaches some aspects of sexual education.	Attendance was affected by a number of issues (participant transportation issues, staff turnover, inclement weather, and inconsistent meeting times)	No adaptations were made during the course of the study period.
Teen Outreach Program (TOP®), Planned Parenthood of the Great Northwest; Seattle, Washington	68% of the CV youth reported having sexuality education during school health instruction.	School-related events (i.e., fire drills); geographic distance and isolation; rural schools had issues with lack of transportation; Difficulties in middle school settings for clubs to develop meaningful CSL experiences when students were not able to leave during the school day.	No adaptations were made during the course of the study period.
Teen Outreach Program (TOP®), The Women's Clinic of Kansas City; Independence, Missouri	Partner organizations offered content on domestic violence issues and sexual abuse.	Nine months before this study began, the school district lost its accreditation.	No adaptations were made during the course of the study period.
Safer Sex; Louisiana Public Health Institute; New Orleans, Louisiana	It is notable that 13% of participants (16 Safer Sex Intervention and 17 Female Sexual Health) self-reported on the baseline questionnaire that they had participated in another TPP program (other than Safer Sex Intervention or SMARTS) in the past year.	Time restrictions limiting full session implementation; Turnover among health educators at the various implementation study sites.	No adaptations were made during the course of the study period.
Seventeen Days, Carnegie Mellon University; Pittsburgh, Pennsylvania	Online delivery method.	Clinics had insufficient waiting time (i.e., time to complete the intervention as intended); Technology issues prohibited or hindered participation; Participants viewing an alternate video due to programming glitch	No adaptations were made during the course of the study period.

Table 6. Continued

Program Title	OAH Implementation Element: Context (Questions 1 - 3)		
	Q1. Other TPP programming available or offered to study participants (Both intervention & comparison).	Q2. External events affecting implementation	Q3. Substantial unplanned adaption(s)
	Result(s)	**Result(s)**	**Result(s)**
Alaska Promoting Health Among Teens, Comprehensive Abstinence and Safer Sex Practices (AKPHAT Comp), State of Alaska, Department of Health and Social Services; Anchorage, Alaska	No other services were offered through the schools. Planned Parenthood of the Great Northwest was implementing an evidence-based TPP program, the Teen Outreach Program, in Anchorage.	Restrictions from the Governor's office; IRB Research Compliance Issues; Geographic Distance limited ability to work in small, rural communities; Time restrictions.	Adaptation rates were highest for modules 4, 12, and 8. Within module 4, seven implementations skipped the last role-play due to lack of time.
Be yoU, Talented, Informed, Fearless, Uncompromised, and Loved (BUtiful)--Adaptation of SiHLE, Tulane University School of Public Health and Tropical Medicine; New Orleans, Louisiana	A small percentage of participants reported at enrollment that they had participated in other teen pregnancy prevention programs in the past (6.9% of BUtiful and 7.3% of DIVAS participants).	Technical issues closed down the websites for a period of time (generally no longer than a couple of hours) causing non-access to sites is reported.	No adaptations were made during the course of the study period.
Be Yourself/Se Tu Mismo, George Washington University; Washington, DC	No additional TPP programs were reported.	Challenges given competing priorities (e.g., jobs, sports, caring for younger siblings); Retention and attendance.	No adaptations were made during the course of the study period.
Crossroads, Arlington Independent School District; Arlington, Texas	Youth who were pregnant or parenting may have received additional programming and support from a parenting education program, or youth may have had access to community-based services such as local health clinics.	Time restrictions; Teachers, staff, parents, and youth presented resistance, which contributed to low recruitment and retention numbers.	Only one substantial unplanned adaptation: The original length of the programs included 21 hours of curriculum across three days. It was necessary to shorten the length of the individual days in order to ensure youth were returned to campus by the end of the school day.
Haitian American Responsible Teens (HART), Boston Medical Center; Boston, Massachusetts	No additional TPP programs were reported.	School structural changes; Length of time from introduction to buy-in by School administrators; School closures (consolidation of Boston Public Schools); Length of time of IRB approval in the first year.	The addition of a summer camp each year to assure adequate numbers
Healthy Futures, Black Ministerial Alliance of Greater Boston; Boston, Massachusetts	16% of treatment and control students (77 of 476 and 81 of 520, respectively) reported exposure to programs that address sexual activity or pregnancy other than HF in 9th grade.	Time restrictions; Day school would allow HF program to implement; district turmoil (unrelated to the teen pregnancy prevention programming in this project).	HF adapted the program to be delivered over two days (instead of 8) in the seventh school due to school scheduling conflicts. This school only received 49% of the activities prescribed by the model. HF did not implement the Rhymin' it Write, Code A, or True Connections components as intended.
Multimedia Circle of Life (mCOL), University of Colorado Denver; Denver, Colorado	No additional TPP programs were reported.	Club closures; Program staff turnover caused long delays between youth enrollment and intervention commencement; and financial difficulties.	Facilitators combined some class lessons or shortened others to accommodate shifting attendance and unit closures.
Need to Know (N2K), University of Texas Health Science Center at San Antonio; San Antonio, Texas	Teen pregnancy activities outside of the school in the community, such as at doctor's offices or faith-based, organizations are unknown.	There were no external events, such as changes in the Texas legislation budgets, regarding high school students and sex education programs.	Health educators reported unplanned adaptations due to insufficient time in 0.08% of lessons and running longer than 25 minutes in 0.4% of lessons.

Table 6. Continued

Program Title	OAH Implementation Element: Context (Questions 1 - 3)		
	Q1. Other TPP programming available or offered to study participants (Both intervention & comparison).	Q1. Other TPP programming available or offered to study participants (Both intervention & comparison).	Q1. Other TPP programming available or offered to study participants (Both intervention & comparison).
	Result(s)	**Result(s)**	**Result(s)**
Pono Choices, University of Hawaii; Honolulu, Hawaii	No data were collected about students' exposures to sexual health services and education outside of school or after the delivery of the sexual health curriculum was completed.	Hawai'i Department of Education's research restrictions	No adaptations were made during the course of the study period.
Positive Prevention PLUS, San Bernardino Country Superintendent of Schools; San Bernardino, California	No additional school-wide activities related to pregnancy prevention, sexuality, HIV/AIDs or reproductive health.	Six teachers at one school site were not allowed to conduct the condom demonstration per their school district policy	Teachers' inability to correctly pace the lesson led to adaptations in a way that made the lesson activity less interactive.
Will Power/Won't Power, Volunteers of America, Greater Los Angeles; Los Angeles, California	All 7th-graders receive state- mandated health course.	Unmanageable attrition among high school participants posed challenges to collecting meaningful data and implementation.	No adaptations were made during the course of the study period.
Reducing the Risk and Love Notes, University of Louisville; Louisville, Kentucky	63% of both LN and RtR youth and 58% of PoW youth had had sex education prior to coming to CHAMPS! Camp).	No events occurred that interfered with implementation (e.g. fires, disasters, bad press about TPP).	No adaptations were made during the course of the study period.
Teen Outreach Program Plus Youth All Engaged (text messaging), Denver Health and Hospital Authority; Denver, Colorado	No additional TPP programs were reported.	Barriers were technical (e.g., phone issues, text system issues) and others were individualized issues (e.g., TOP® requests received).	No adaptations were made during the course of the study period.
Web of Life, National Indian Youth Leadership Project; Gallup, New Mexico	Sexual and reproductive health was addressed through 2 or 3 sessions in health, physical education, and wellness classes during the study period when participants were in 6th and 7th grades.	Changes in school schedules; important events in the community; severe weather; changes in key personnel at school sites.	No adaptations were made during the course of the study period.

Adherence. All 15 Tier I TPP program cases reported high fidelity (at least 75%) with regard to the number and frequency of session offerings (OAH Adherence Question 1) (The Policy & Research Group, 2015a; Coyle et al., 2016; Walker, Inoa, & Coppola, 2016; Seshadri et al., 2015; Crean, Seibold-Simpson, Jambon, & Kreipe, 2015; Daley et al., 2015; Francis, Woodford, & Kelsey, 2015; Philiber, Philiber, & Brown, 2015; Robinson, Kaufman, & Cahill, 2016; Herrling, 2015; Tucker, & Associates, 2015; Coyle, Potter, Glassman, McDade-Montez, & Unti, 2015; Philiber & Philiber, 2016; The Policy & Research Group, 2015b; Eichner, Salaway, Smith-Jones, & McCall, 2015).

Authors from nine of the fifteen programs (60%) reported participants were present and received full program content during the implementation period (OAH Adherence Question 2) (The Policy & Research Group, 2015a; Coyle et al., 2016; Walker, Inoa, & Coppola, 2016; Seshadri et al., 2015; Crean, Seibold-Simpson, Jambon, & Kreipe, 2015; Daley et al., 2015; Francis, Woodford, & Kelsey, 2015; Philiber, Philiber, & Brown, 2015; Robinson, Kaufman, & Cahill, 2016). The remaining six cases reported challenges with participant retention and subsequent dosage during one or more years of the implementation cycle (Herrling, 2015; Tucker, & Associates, 2015; Coyle, Potter, Glassman, McDade-Montez, & Unti, 2015; Philiber & Philiber, 2016; The Policy & Research Group, 2015b; Eichner, Salaway, Smith-Jones, & McCall, 2015). Each Tier I case report extensively described the TPP program being implemented and all cases utilized facilitators who received training during the one year phase-in implementation timeframe, as well as throughout the program duration (OAH Adherence Question 3) (The Policy & Research Group, 2015a; Coyle et al., 2016; Walker, Inoa, & Coppola,

2016; Seshadri et al., 2015; Crean, Seibold-Simpson, Jambon, & Kreipe, 2015; Daley et al., 2015; Francis, Woodford, & Kelsey, 2015;Philiber, Philiber, & Brown, 2015; Robinson, Kaufman, & Cahill, 2016; Herrling, 2015; Tucker, & Associates, 2015; Coyle, Potter, Glassman, McDade-Montez, & Unti, 2015; Philiber & Philiber, 2016; The Policy & Research Group, 2015b; Eichner, Salaway, Smith-Jones, & McCall, 2015).

Authors of all Tier II demonstration/innovation program reports (n=14) denoted high fidelity (at least 75%) with regard to the number and frequency of session offered (OAH Adherence Question 1) (Martin, Hill, Nye, & Hollman-Billermeier, 2015; Kissinger et al., 2015; Slater, & Mitschke, 2015; Ruwe, McCloskey, Meyers, Prudent, & Foureau-Dorsinville, 2016; Calise, Chow, & Dore, 2015; Dierschke, Gelfond, Lowe, Schenken, & Plastino, 2015; Abe, Barker, Chan, & Eucogco, 2015; LaChausse, 2015; Advanced Empirical Solutions, 2015; Bull, Schmiege, & Devine, 2015; Carter, Beadnell, & Vankslyke, 2015; Cunningham, van Zyl, & Borders, 2016; Vyas, Wood, Landry, Douglass, & Fallon, 2015; Schwinn et al., 2015). Eleven of the fourteen cases (64%) reported participants were present and received full program content during the implementation period (OAH Adherence Question 2) (Martin, Hill, Nye, & Hollman-Billermeier, 2015; Kissinger et al., 2015; Schwinn et al., 2015; Vyas, Wood, Landry, Douglass, & Fallon, 2015; Slater, & Mitschke, 2015; Ruwe, McCloskey, Meyers, Prudent, & Foureau-Dorsinville, 2016; Calise, Chow, & Dore, 2015; Dierschke, Gelfond, Lowe, Schenken, & Plastino, 2015; Abe, Barker, Chan, & Eucogco, 2015; LaChausse, 2015; Advanced Empirical Solutions, 2015; Bull, Schmiege, & Devine, 2015; Cunningham, van Zyl, & Borders, 2016). Schwinn et al. (2015) who evaluated Be

Yourself/Se Tu Mismo and Vyas, Wood, Landry, Douglass & Fallon (2015) who evaluated Multi Circle of Life (mCOL) reported challenges with participant retention and less than half of the youth received 75% of program content and only 45% of youth participants completed the online curriculum, respectively.

Case findings from Carter, Beadnell, & Vankslyke (2015) who evaluated The Web of Life program reported oscillating dosages among Cohorts 1-4 over the full implementation period. Each Tier II case described the TPP program in detail and reported using trained facilitators during the phase-in implementation phase, as well as throughout the program duration (OAH Adherence Question 3) (Martin, Hill, Nye, & Hollman-Billermeier, 2015; Kissinger et al., 2015; Slater, & Mitschke, 2015; Ruwe, McCloskey, Meyers, Prudent, & Foureau-Dorsinville, 2016; Calise, Chow, & Dore, 2015; Dierschke, Gelfond, Lowe, Schenken, & Plastino, 2015; Abe, Barker, Chan, & Eucogco, 2015; LaChausse, 2015; Advanced Empirical Solutions, 2015; Bull, Schmiege, & Devine, 2015; Carter, Beadnell, & Vankslyke, 2015; Cunningham, van Zyl, & Borders, 2016; Vyas, Wood, Landry, Douglass, & Fallon, 2015; Schwinn et al., 2015).

Quality. OAH measured quality by assessing the staff-participant interaction and the level of youth engagement in the TPP program. Among 14 of the 15 Tier I case reports, the average staff (i.e., facilitator) rating was 4.75/5.0 for quality of interaction with participants. This average excluded case results from Eichner, Salaway, Smith-Jones, & McCall (2015) due to the online delivery platform of the Seventeen Days programs. Staff-participant interaction ranged from 53% of staff scoring a 5.0/5.0 in the Tucker, & Associates (2015) Children's Aid Society/Carrera Adolescent Pregnancy

Prevention Program (CAS) to 95% of staff positive interactions reported by Philiber & Philiber (2016) who evaluated the Teen Outreach Program (TOP®), The Women's Clinic of Kansas City, Missouri program.

The case results for youth engagement stated that, overall, adolescents were highly engaged in program content and activities during traditional, face-to-face implementation (The Policy & Research Group, 2015a; Coyle et al., 2016; Walker, Inoa, & Coppola, 2016; Seshadri et al., 2015; Crean, Seibold-Simpson, Jambon, & Kreipe, 2015; Daley et al., 2015; Francis, Woodford, & Kelsey, 2015; Philiber, Philiber, & Brown, 2015; Robinson, Kaufman, & Cahill, 2016; Herrling, 2015; Tucker, & Associates, 2015; Coyle, Potter, Glassman, McDade-Montez, & Unti, 2015; Philiber & Philiber, 2016; The Policy & Research Group, 2015b). For example, results from Philiber, Philiber, & Brown (2015) who evaluated the Teen Outreach Program (TOP®) of the Great Northwest, rated youth engagement in participatory activities very high (to a great extent) in 97% of the sessions.

Among all Tier II program case reports, authors reported positive relationships between staff and participants during implementation. Average ratings of staff-participant interaction ranged from 4.0/5.0 to 5.0/5.0 in all face-to-face implementation environments (Martin, Hill, Nye, & Hollman-Billermeier, 2015; Slater, & Mitschke, 2015; Ruwe, McCloskey, Meyers, Prudent, & Foureau-Dorsinville, 2016; Calise, Chow, & Dore, 2015; Dierschke, Gelfond, Lowe, Schenken, & Plastino, 2015; Abe, Barker, Chan, & Eucogco, 2015; LaChausse, 2015; Advanced Empirical Solutions, 2015; Bull, Schmiege, & Devine, 2015; Carter, Beadnell, & Vankslyke, 2015; Cunningham, van

Zyl, & Borders, 2016). Case observation results from Slater & Mitschke (2015) who evaluated the Crossroads Teen Pregnancy Prevention in Arlington, Texas noted all facilitators scored a 4 or higher, demonstrating "excellent" levels of rapport and communication between staff and youth. Additionally, youth engagement in all Tier II programs (n=14) was recorded as 'high' according to facilitator feedback logs and external observer reports. For example, Calise, Chow, & Dore (2015) who evaluated The Healthy Futures Teen Pregnancy Prevention Program recorded youth as actively engaged in 90% of the observed sessions in 6th grade, 100% of the observed sessions in 7th grade, and 95% of the observed sessions in the 8th grade.

Context. OAH assessed the context in which program implementation took place by measuring three elements: (Question 1) Other TPP programs treatment and/or control youth may have been exposed to, (Question 2) Eternal events affecting, implementation, and (Question 3) Substantial unplanned adaptions to the program during the program period. Among Tier I replication case, 80% (n=12) of reports described treatment and/or control youth received or were exposed to other TPP programing during the implementation period (The Policy & Research Group, 2015a; Coyle et al., 2016; Seshadri et al., 2015; Crean, Seibold-Simpson, Jambon, & Kreipe, 2015; Daley et al., 2015; Francis, Woodford, & Kelsey, 2015; Philiber, Philiber, & Brown, 2015; Robinson, Kaufman, & Cahill, 2016; Tucker, & Associates, 2015; Coyle, Potter, Glassman, McDade-Montez, & Unti, 2015; The Policy & Research Group, 2015b). Uniquely, Seshadri et al. (2015) who evaluated the Teen Outreach Program (TOP®) Chicago Public Schools reported a school-district wide program offering access to health services

in the school health clinic, including condom availability for students, occurring during the TPP program implementation. Three program cases (20%), Herrling (2015) who evaluated Children's Aid Society/Carrera Adolescent Pregnancy Prevention Program (CAS), Walker, Inoa, & Coppola (2016) who evaluated Promoting Health among Teens! Abstinence-Only, and Coyle, Potter, Glassman, McDade-Montez, & Unti (2015) who evaluated It's Your Game: Keep it Real (IYG) South Carolina reported no outside TPP programing interfered with the OAH TPP replication. Furthermore, Philiber & Philiber (2016) who provided findings from the Teen Outreach Program (TOP®), The Women's Clinic of Kansas City reported partner organizations offered program content about domestic violence issues and sexual abuse without a focus on teen pregnancy prevention (Context Question 1).

Tier I case reports described external events impacting implementation and included a variety of issues. School district and/or community facility policies restricted implementation for many programs (Seshadri et al., 2015; Crean, Seibold-Simpson, Jambon, & Kreipe, 2015; Philiber & Philiber, 2016), while facilitator issues such as turn-over, strike, and inefficient time to complete lessons affected implementation in other cases (Tucker, & Associates, 2015; Herrling, 2015; Walker, Inoa, & Coppola, 2016; The Policy & Research Group, 2015b). Francis, Woodford, & Kelsey (2015) reported difficultly leading community service learning projects as a barrier in the TOP®, Minneapolis, Minnesota program, while technology and clinic access issues became problematic for implementation in the Seventeen Days program case report (Eichner, Salaway, Smith-Jones, & McCall, 2015) (Context Question 2). No Tier I case reports

described unplanned adaptations to the program during the implementation period (Context Question 3).

Forty-two percent (n=6) of the Tier II demonstration/innovation program cases reported no additional TPP programs were offered or influenced the treatment and/or control youth during the OAH implementation period (Context Question 1) (Martin, Hill, Nye, & Hollman-Billermeier, 2015; Ruwe, McCloskey, Meyers, Prudent, & Foureau-Dorsinville, 2016; LaChausse, 2015; Bull, Schmiege, & Devine, 2015; Vyas, Wood, Landry, Douglass, & Fallon, 2015; Schwinn et al., 2015). External events described in 12 Tier II case reports (86%) included restrictive state and/or local school district policy (Context Question 2) (Martin, Hill, Nye, & Hollman-Billermeier, 2015; Abe, Barker, Chan, & Eucogco, 2015; LaChausse, 2015; Carter, Beadnell, & Vankslyke, 2015; Calise, Chow, & Dore, 2015), and time restrictions and competition from other activities were cited by Kissinger et al., (2015) who evaluated Be Yourself/Se Tu Mismo and Slater & Mitschke (2015) who evaluated the Crossroads Program in Arlington, Texas. Schwinn et al. (2015) who evaluated the Multimedia Circle of Life (mCOL) program reported youth club closures negatively affecting implementation. Evidence from Dierschke, Gelfond, Lowe, Schenken, & Plastino (2015) who evaluated Need 2 Know (N2K) and Cunningham, van Zyl, & Borders (2016) who evaluated Reducing the Risk and Love Notes programs recorded no external events affected implementation through the program period. Unplanned adaptions to the TPP program were reported in 36% (n=5) of the Tier II cases reports via staff records and described insufficient time to complete lessons leading to shortening or omitting program content (Context Questions

3) (Martin, Hill, Nye, & Hollman-Billermeier, 2015; Slater, & Mitschke, 2015; Calise, Chow, & Dore, 2015; Schwinn et al., 2015; Dierschke, Gelfond, Lowe, Schenken, & Plastino, 2015).

The final elements used to assess the OAH performance measures included the (a) type, (b) frequency, (c) method, and (d) party responsible for collecting the implementation performance measures and data (OAH, 2016b). Due to requirements within the OAH grantee template (Appendix D) data collection strategies across each performance measurements were congruent across all Tier I and II programs (n=29). Universal reporting forms (i.e., OAH Lesson Fidelity Monitoring Log or Program Observations Form), participant attendance via district or organization recordkeeping systems, and formal and informal communication between facilitators, program evaluators, and/or research evaluators were described as part of the data collection strategies. Figure 8 displays results for the OAH performance measure type, frequency, method, and party responsible for data collection (The Policy & Research Group, 2015a; Coyle et al., 2016; Walker, Inoa, Coppola, 2016; Seshadri et al., 2015; Crean, Seibold-Simpson, Jambon, & Kreipe, 2015; Daley et al., 2015; Francis, Woodford, & Kelsey, 2015; Philiber, Philiber, & Brown, 2015; Robinson, Kaufman, & Cahill, 2016; Herrling, 2015; Tucker, & Associates, 2015; Coyle, Potter, Glassman, McDade-Montez, & Unti, 2015; Philiber & Philiber, 2016; The Policy & Research Group, 2015b; Eichner, Salaway, Smith-Jones, & McCall, 2015; Martin, Hill, Nye, & Hollman-Billermeier, 2015; Kissinger et al., 2015; Slater, & Mitschke, 2015; Ruwe, McCloskey, Meyers, Prudent, & Foureau-Dorsinville, 2016; Calise, Chow, & Dore, 2015; Dierschke,

Gelfond, Lowe, Schenken, & Plastino, 2015; Abe, Barker, Chan, & Eucogco, 2015; LaChausse, 2015; Advanced Empirical Solutions, 2015; Bull, Schmiege, & Devine, 2015; Carter, Beadnell, & Vankslyke, 2015; Cunningham, van Zyl, & Borders, 2016; Vyas, Wood, Landry, Douglass, & Fallon, 2015; Schwinn et al., 2015).

Exploratory Major Themes and Sub-Themes

Inductive coding processes used for this study yielded four major themes, Evaluation Study, TPP Program, Implementation Methods, and Lessons Learned during Implementation Process, and 17 sub-themes which illustrated the implementation practices among the 2010-2014 OAH TPP program case reports. Figure 9 displays the visual Exploratory Code Tree depicting major and sub-themes found in this study. During open axis coding, 46 original codes were identified, however, after inter-coder reliability audits and triangulation with other data sources it was determined that 17 categories (i.e., sub-themes) separated to form majors themes I through IV.

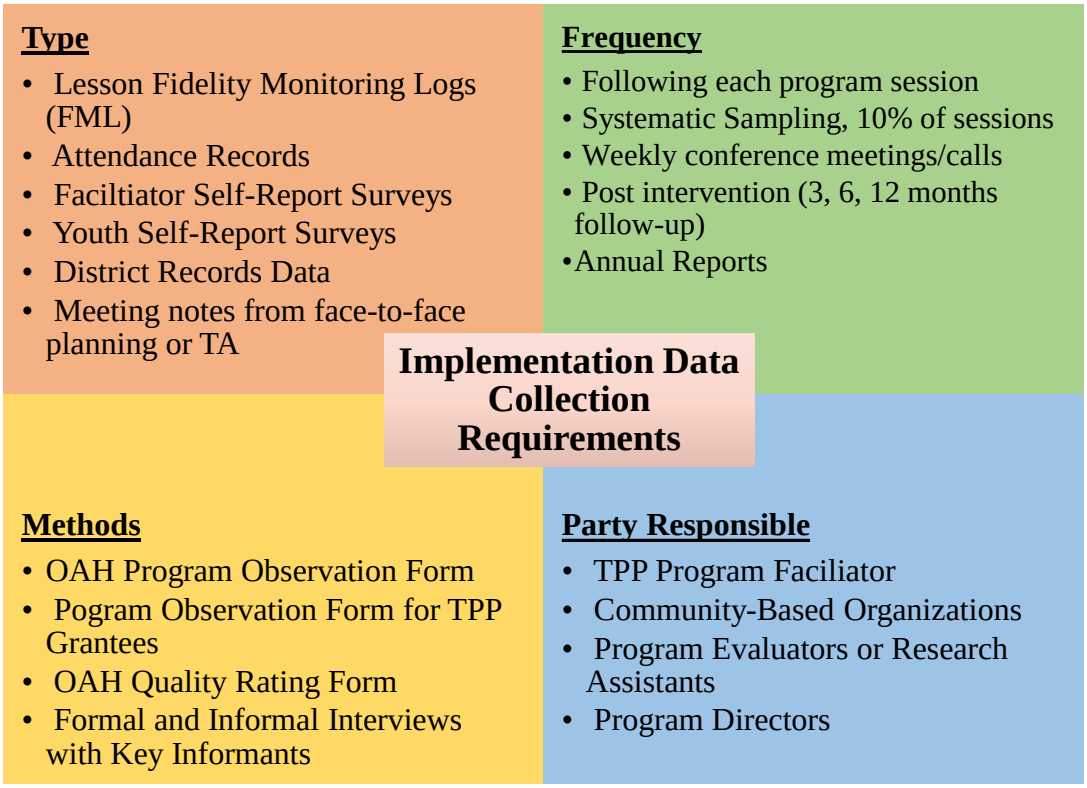

Figure 8. The 2010-2014 Office of Adolescent Health (OAH) Teen Pregnancy Prevention (TPP) Program Implementation Measures and Data Collection Strategies

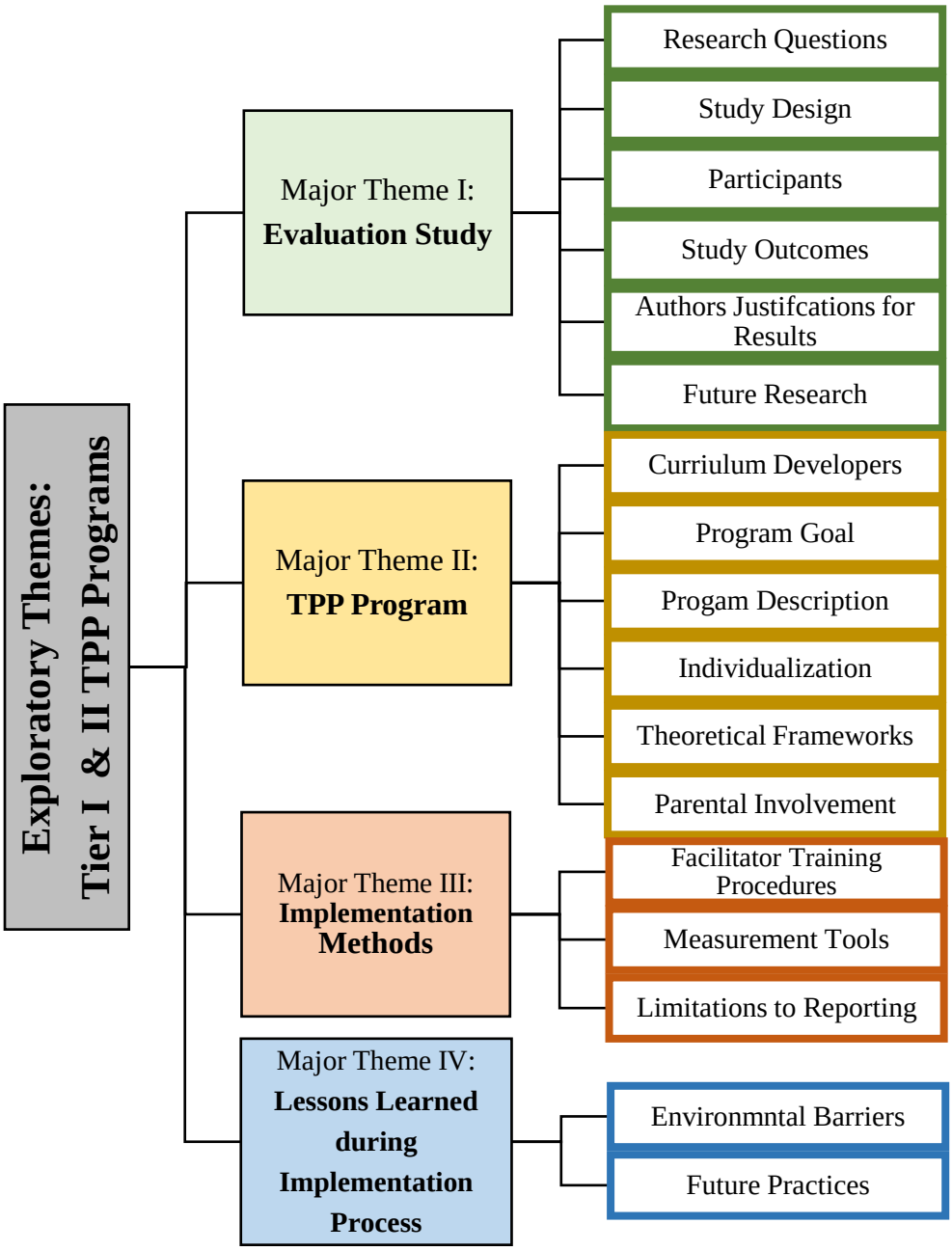

Figure 9. Major Themes and Sub-themes Exploring 2010-2014 Office of Adolescent Health (OAH)

Table 7 contains descriptions of major themes I - IV, sub-themes and code frequencies (i.e., bracketed number corresponds to the number of linked raw data points), TPP program title codes, and sample data units to illustrate sub-themes in alignment with major themes. For ease of reading Table 7, TPP title codes appear: *OAH Tier_Report Number_Location of Implementation_TPP Program*. For example: The Tier I Replication program, ATLAS.ti Report #5, was implemented in Columbia, South Carolina using the It's Your Game (IYG) TPP program (TI_R5_Columbia SC_IYG).

Major Theme I: Evaluation Study. The first theme described elements of the impact evaluation for the TPP program case report. While not the main focus of this study, all 29 case reports included data regarding the research question, study design, participants, study outcomes, author's justifications for results, and areas for future research related to teen pregnancy prevention programming. Among the sub-themes, data units describing the evaluation study design (i.e., RCT or quasi-experimental) and study outcomes (i.e., statistically significant changes in sexual behaviors) represented a large portion of coded data. Interested readers can access Farb & Margolis (2016) for the full TPP program impact report from the 2010-2014 OAH TPP program cohort.

Table 7. Major Themes, Sub-Themes, and Code Frequencies from Exploratory Analysis of TPP Tier I and II Programs (2010-2014)

Major Theme & Description (n=4)	Sub-Themes & Frequencies (n=18)	TPP Program Code	Sample Data Unit
I: Evaluation Study Describes impact evaluation study conducted by individual OAH TPP grantees from 2010-2014.	**Research Question** [55]	All 29 TPP programs	*What is the impact of AKPHAT compared to no program on recent sexual intercourse six months after the end of the program? What is the impact of AKPHAT compared to no program on the recent use of condoms during sexual intercourse six months after the end of the program?* (TII_R1_Anchorage AK_AKPHAT Comp)
	Study Design [121]	All 29 TPP programs	*To estimate the impact of the CAS-Carrera program, relative to the control group on ever having had sex and sexual intercourse without use of effective contraception, an intent-to-treat design was used. An intent-to-treat design estimates the program's impact on all possible youth who were enrolled in the treatment group, regardless of the level of participation*. (TI_R3_Chicago IL_CAS)
	Participants [83]	All 29 TPP programs	*Youth were eligible to participate in the study if they were enrolled in 7th grade at a participating school in fall 2011, did not have limited capabilities or special needs as determined by the school, and spoke English well enough to understand the survey questions if they were read aloud. (*TI_R5_Columbia SC_IYG)
	Study Outcomes [140]	All 29 TPP programs	*It is important to note that although the curriculum component program was implemented with fidelity, participant attendance was low (64.75% for intervention youth and 61.79% for comparison youth), and it is plausible that this attributed to a lack of significant findings*. (TII_R3_Washington DC_Be Yourself/Se Tu Mismo)
	Authors Justifications for Results [80]	All 29 TPP programs	*The limited uptake of these other components was most likely a result of competing priorities for schools, students, and parents during out-of-school time and the self- selection process HF used to recruit students and parents. Additionally, while HF was a multi- level program, it did not address the community-level risk and protective factors (e.g., socioeconomic determinants) that affect teen sexual decision making and behavior*. (TII_R7_Boston MA_Healthy Futures)
	Future Research [39]	All 29 TPP programs	*Further research on the role teacher's play in the effectiveness of sex education programs and how to predict teacher needs for support prior to implementation may yield insights for continuing to strengthen training and support systems.* (TI_R4_Houston TX_IYG)
II. Teen Pregnancy Prevention (TPP) Program Describes unique Tier I and II TPP Programs implemented with adolescents across the United States.	**Curriculum Developers** [4]	TI_R6_Yonkers NY_Promoting Healthy Teens!; TI_R9_Chicago IL_TOP® ; TII_R5_Honolulu HI_Pono Choices; TII_R13_Gallup NM_Web of Life	*The Program Director brought this concern to the attention of the developer who offered guidance on the activities that should be prioritized in these challenging modules*. (TI_R6_Yonkers NY_Promoting Healthy Teens!)
	Program Goal [29]	All 29 TPP programs	*TOP® is a youth development and service learning program designed to reduce teenage pregnancy and increase school success by helping youth develop a positive self-image, life management skills, and realistic goals.* (TI_R10_Minneapolis MN_TOP®)
	Program Description [239]	All 29 TPP programs	*Be yoU, Talented, Informed, Fearless, Uncompromised, and Loved (BUtiful) is an internet- delivered pregnancy prevention intervention that was developed with funding from a Tier 2 Office of Adolescent Health award to implement and rigorously evaluate new and innovative programs to prevent teen pregnancy, especially within high-risk, vulnerable, and culturally under-represented youth populations.* (TII_R2_New Orleans LA_BUfitul)
	Individualization [32]	TI_R8_PIttsburgh PA_Seventeen Days; TII_R8_Louisville KY_Love Notes and Reducing the Risk; TII_R12_Denver CO_YAE; TII_R5_Honolulu HI_Pono Choices; TII_R9_Denver CO_mCircle of Life; TII_R13_Gallup NM_Web of Life; TII_R14_Los Angeles CA_Will Power/Wont Power	*As with the initial session, health educators customize the booster sessions based on the participants' personal assessments of where they are on the "Wheel of Change."* (TI_R7_New Orleans LA_Safer Sex)
	Theoretical Frameworks [26]	All 29 TPP programs	*Finally, the Pono Choices curriculum utilizes the developmental assets/resiliency model. This theory seeks to enable youth to participate in socially useful tasks so that they become healthy adults, in spite of adversity, and demonstrate positive results in self-esteem and moral development.* (TII_R5_Honolulu HI_Pono Choices)
	Parental Involvement [14]	TI_R4_Houston TX_IYG; TI_R5_Columbia SC_IYG; TI_R6_Yonkers NY_Promoting Healthy Teens!; TII_R5_Honolulu HI_Pono Choices; TII_R7_Boston MA_Healthy Futures; TII_R10_San Antonio TX_N2K; TII_R14_Los Angeles CA_Will Power/Wont Power	*Parents were given the opportunity to view/inspect the N2K curriculum in the school or district office, or at a program viewing night offered each fall at each school to have any questions answered*. (TII_R10_San Antonio TX_N2K)

Table 7. Continued

Major Theme & Description (n=4)	Sub-Themes & Frequencies (n=18)	TPP Program Code	Sample Data Unit
III. Implementation Methods Describes tools and logistical elements needed to implement and report findings from each TPP intervention.	**Facilitator Training Procedures** [95]	All 29 TPP programs	*Once hired, they [facilitators] received intense training and clinical support throughout the program. The initial training, which they received over 2.5 days, gave them a comprehensive overview of the project, information on the curriculum, and an opportunity to practice their facilitation skills with their peers*. (TI_R6_Yonkers NY_Promoting Healthy Teens!)
	Measurement Tools [43]	All 29 TPP programs	*Program Observation Form for TPP Grantees: This form was used to collect data on the overall quality of the program session and delivery of the information. These were to be completed for 20% of all BART and Healthy Living sessions completed by a fidelity monitor.*(TI_R1_ New Orleans LA_BART)
	Limitations to Reporting [9]	TI_R7_New Orleans LA_Safer Sex; TI_R2_Atlanta GA_CAS; TI_R9_Chicago IL_TOP® ; TI_R1_ New Orleans LA_BART	*A substantial number of teachers did not report attendance (51% missing for 7th grade and 30% missing at 8th grade) despite incentives and repeat reminders. The lack of complete attendance data makes it difficult to fully assess program adherence related to student dosage in 7th and 8th grade.* (TI_R4_Houston TX_IYG)
IV. Lessons Learned during Implementation Process Describes important lessons learned throughout the implementation process which can improve current and/or future TPP efforts.	**Environmental Barriers** [67]	All 29 TPP programs	*Technology issues affected implementation at every clinic in the study. These issues varied by site but the major issues were slow and unreliable Internet connections in the rural sites, and conflicts between the clinic's and the study's wireless devices in some of the larger sites*. (TI_R8_PIttsburgh PA_Seventeen Days)
	Future Practice [14]	TI_R2_Atlanta GA_CAS; TII_R3_Washington DC_Be Yourself/Se Tu Mismo; TII_R4_Arlington TX_Crossroads; TII_R8_Louisville KY_Love Notes and Reducing the Risk	*Reducing the program to one day and offering it on days when youth are not required to be in school may be a more effective strategy to overcome this challenge, though it would likely prove challenging to deliver all the major content in just 6-8 hours.* (TI_R2_Atlanta GA_CAS)

Major Theme II: Teen Pregnancy Prevention (TPP) Program. Within this major theme, data described components of the individual Tier I and II TPP programs implemented with adolescents across the United States. Program goals, description, and theoretical frameworks used to develop the TPP program were reported in all 29 case reports. In several Tier I replication case reports, authors described occasions when the implementing organization contacted the original program developer (i.e. Education, Training, and Research ETR, Inc.) to elicit clarification on program activities and request suggested adaptations (Walker, Inoa, & Coppola, 2016; Seshadri et al., 2015; Abe, Barker, Chan, & Eucogco, 2015; Carter, Beadnell, & Vankslyke, 2015). Seven (24%) of the total 29 TPP program case reports described organziations individualizing program content in order to tailor messaging to participant sub-groups within the study (Eichner, Salaway, Smith-Jones, & McCall, 2015; Cunningham, van Zyl, & Borders, 2016; Bull, Schmiege, & Devine, 2015; Carter, Beadnell, & Vankslyke, 2015; Advanced Empirical Solutions, 2015; Abe, Barker, Chan, & Eucogco, 2015; Schwinn et al., 2015). For example, Eichner, Salaway, Smith-Jones, & McCall (2015) who evaluated the online program, Seventeen Days, reported individualized content as:

> The viewing experience is individualized, because participants have their own tablet and can select content relevant to their needs without being inhibited or influenced by other people. The video also invites the girls to apply the demonstrated skills in their own lives (p. 6).

Parental involvement with the TPP program was cited in seven cases (24%) across Tier I and II and was described as improving the overall TPP program and level of youth

engagement (Coyle et al., 2016; Coyle, Potter, Glassman, McDade-Montez, & Unti, 2015; Walker, Inoa, & Coppola, 2016; Abe, Barker, Chan, & Eucogco, 2015; Calise, Chow, & Dore, 2015; Dierschke, Gelfond, Lowe, Schenken, & Plastino, 2015; Advanced Empirical Solutions, 2015). Case findings reported by Calise, Chose, & Core (2015) who evaluated The Healthy Futures Teen Pregnancy Prevention Program asserted:

> At the end of each of the 24 sessions, students receive parent connection forms to complete with their parent at home. Each form reviews the topics covered that day and provides additional resources for parents (e.g., reminders to visit ontheirlevel.org). Students are encouraged to return the bottom portion of 21 of the 24 forms (completed and signed by a parent) during the next session (p.7).

Major Theme III: Implementations Methods. The implementation methods included three sub-themes which helped improve logistic and programmatic functions during implementation: Facilitator Training Procedures, Measurement Tools, and Limitations to Reporting. All 29 TPP case reports included evidence of training procedures used to prepare facilitators to carry-out the TPP programs will high fidelity and quality. Training involved single and multiple day exposures to TPP program content, opportunities for behavioral teach-based experiences, and thorough practice working with OAH data collection methods (i.e., Fidelity Monitoring Logs). The Policy & Research Group (2015b) case findings from Safer Sex Program detailed necessary qualifications for becoming a trained facilitator and concluded:

> All health educators were expected to have either a master's degree in a science or health-related field (like public health) or a bachelor's degree in a science or health-related field with three years of relevant experience; relevant experience working with data collection, study coordination, and IRBs; and two years serving as a health educator, preferably in the field of sexual health education (p. 6).

The performance measurement data collection elements OAH required each Tier I and II TPP program are described in Figure 8 and allowed the TPP cases reports to accurately report daily, weekly and monthly progress towards fidelity among each program (OAH, 2016b). Robinson, Kaufman, & Cahill (2016) who evaluated The Teen Outreach Program in New Orleans, LA and Rochester, NY reported,

> Facilitators submitted data on the lessons they were completing, and activities planned/completed for each club session via an online data portal. They also reported data on additional lesson specific fidelity monitoring logs at the end of each lesson, which were submitted via email or fax (p. 11).

Coyle et al. (2016) who evaluated It's Your Game Teen Pregnancy Program implemented in Houston, Texas described,

> Log data are collected throughout implementation on all sessions. Teachers are expected to log sessions within 5 school days of teaching them, and are incentivized to log in a timely manner. Record data collected ongoing through the year. Sample of 3% of all sessions across 7th and 8th grade facilitators in 2012-2013, 2013-2014 and 2014-2015 school years (p. 38).

Reporting limitations affecting compliance with the OAH required performance measurement tools were reported by 14% of TPP program case reports (n=4). Findings from Tier I program cases The Policy & Research Group (2015b) who evaluated Safe Sex reported changes to implementation site contracts mid-program, Herrling (2015) who evaluated Children's Aid Society/CAS Chicago described issues with facilitator reporting non-compliance, Seshadri et al. (2015) who evaluated Teen Outreach Program TOP® Chicago Public Schools reported delays to program start dates, and The Policy & Research Group (2015a) who evaluated Becoming a Responsible Teen (BART) program recorded bias in documenting implementation results, as barriers to effective and efficacious reporting. The Policy & Research Group (2015a) evaluators of BART described facilitator reporting bias as:

> …There are several limitations of the implementation data: 1) health educator self-reports may not be a reliable measure of the content that was actually delivered to participants; additionally, we do not have complete self-report data for all BART and Healthy Living intervention sessions delivered (p. 18-19).

Major Theme IV: Lessons Learned during Implementation Process. The final theme included data which described what TPP program organizations and evaluators learned throughout the process and how those lessons can help shape future implementation practice. Major theme IV contains three main sub-themes: Environmental Barriers and Future Practices. All 29 TPP program case reports described environmental barriers which affected the implementation process. Scheduling and logistical conflicts between implementation sites, partners, and facilitators presented the

largest barriers to implementation. Many school-based program cases experienced changes in district infrastructure, key personnel leaving, and shifting daily schedules as implementation obstacles (Herrling, 2015; Philiber & Philiber, 2016; Walker, Inoa, & Coppola, 2016; Ruwe, McCloskey, Meyers, Prudent, & Foureau-Dorsinville, 2016; Martin, Hill, Nye, & Hollman-Billermeier, 2015). Cunningham, van Zyl, & Borders (2016) evaluators of the Reducing the Risk and Love Notes TPP program reported,

> We simply did not have the program staff, and could not have secured the community facilitators' cooperation, or gained extended access to their settings, to deliver so many program days for 12 to 14 weeks each outside of a school setting (p. 29).

Technology issues among TPP programs delivered online in health clinics (Eichner, Salaway, Smith-Jones, & McCall, 2015; Schwinn et al., 2015), and weather delays affecting transportation to-and-from the program were reported as barriers to implementation for TPP program cases (Daley et al., 2015). Community opposition and hesitation from parents was also reported as an environmental barrier impeding full program implementation in two cases (Philiber, Philiber, & Brown, 2015; Coyle, Potter, Glassman, McDade-Montez, & Unti, 2015). Case findings from Martin, Hill, Nye, & Hollman-Billermeier (2015) who evaluated the Alaska Promoting Health Among Teens, Comprehensive Abstinence and Safer Sex Practices (AKPHAT) program, described community opposition in the form of resistance from tribal leaders as,

> In post-implementation interviews with tribal council members, rural implementation staff, and administrators at tribal non-profits, several people told

> us that tribal organizations were reluctant to implement a randomized study. They felt that dividing youth into treatment and control groups could be perceived by their constituents as denying services to some of the population (p. 9).

Future practices was the final sub-theme which described lessons learned during the implementation process (theme IV). Three (10%) of the TPP program case reports provided specific suggestions for changing implementation in future delivery. Vyas, Wood, Landy, Douglass, & Fallon (2015) who evaluated The Be Yourself/Se Tu Mismo, Tucker & Associates (2015) who evaluated the Children's Aid Society/Carrera Adolescent Pregnancy Prevention Program (CAS) in Atlanta, Georgia and Cunningham, van Zyl, & Borders (2016) who evaluated the Love Notes and Reducing the Risk programs all suggested flexible delivery models would improve future implementation. For example, The Tucker & Associates (2015) report concluded "For the Carrera program to succeed in a community such as this, they must offer a flexible schedule for youth to receive dosage while participating in their sport" (p. 33).

Herrling (2015) who evaluated the Children's Aid Society/Carrera Adolescent Pregnancy Prevention Program (CAS) in Chicago, Illinois suggested building relationships with implementation partners in the school and community as vital to future TPP program implementation. The Herrling (2015) case report cited:

> Such high levels of turnover may have a deleterious effect on programming and lead to a necessity to build new relationships with school staff and, more importantly, with the program participants and their parents. Staff turnover in

> school administration at two of the schools also caused programmatic delays (p. 24).

Finally, Cunningham, van Zyl, & Borders (2016) who evaluated the Love Notes and Reducing the Risk Program expressed the benefit of their implementation structure and suggested the flexible model for future delivery. Cunningham, van Zyl, & Borders (2016) concluded,

> Although we have expressed concerns about program duration, it is important to note that the intense exposure approach used in this study has several advantages. (1) The intensive approach is highly efficient in terms of personnel, logistics, travel time, and facilities requirements and costs. Our small program staff was able to deliver two sets of interventions on 39 occasions, for a total of 78 completed program days, at 23 different community sites (p. 29).

Discussion

Research and practice suggest that implementing adolescent health programs, specifically targeting teen pregnancy prevention, is complex and influenced by multiple factors (Kirby, 2007; CDC, 2016). This study represents the first cross-case analysis attempting to understand the relationships among theoretical frameworks, empirical data reports, and observed experiences which impact the TPP program implementation environment. The overall purpose of the study was t*o investigate the implementation practices among a case sample of TPP program models using theoretical and applied research frameworks,* and the research questions were (1) *To what extent does the*

Implementation Science CFIR describe the implementation practices among the 2010-2014 Office of Adolescent Health Teen Pregnancy Prevention Program cohort? and (2) *To what extent are results from implementation performance measures (i.e., Adherence, Quality, and Context) similar or different across the 2010-2014 OAH TPP program cohort?*

Research Question 1: CFIR Key Insights and Implications

Using the CFIR to evaluate the cohort of TPP program case reports provided key insights about the implementation process. Most notably, both Tier I and Tier II program case reports included data discussing all five CFIR domains (Intervention, Organization, Community, Facilitator, Process). This finding points to the advantages of considering a comprehensive model, such as CFIR, when retrospectively evaluating the implementation process using a case study design (Damschroder et al., 2009). CFIR provides a systematic assessment tool which can help identify the multi-level factors related to implementation and improve future practice (Powell, Proctor, & Glass, 2014). Using a theoretical tool can assist program developers and key stakeholders plan and execute practices which directly influence program delivery and implementation (Damschroder et al., 2009; Fixsen et al., 2005).

Comparing the Tier I and Tier II program case alignment with CFIR, Tier I case results included more description about community partnerships through networks and communication (Domain 2, 2.2-2.4 and Domain 3, 3.1-3.5.2) compared with Tier II case counterparts. A large portion of the Tier I program cases replicated the Teen Outreach Program (TOP®) which contained a community service learning component, and thus

required stronger connections outside the immediate implementation setting (Francis, Woodford, & Kelsey, 2015; Philiber, Philiber, & Brown, 2015; Robinson, Kaufman, & Cahill, 2016). Tier II program cases provided more data aligned to Domain 1 Intervention, sub-construct 1.4 Adaptability. Tier II case results described organizer's ability to tailor program messages, content, and delivery formats which allowed for successful implementation with and engagement from adolescents (Abe, Barker, Chan, & Eucogco, 2015; Ruwe, McCloskey, Meyers, Prudent, & Foureau-Dorsinville, 2016). Adolescent health programs must contain relevant information and activities in order to increase interest and engagement from audience members (Advocates for Youth, 2008).

Another insight uncovered by using the CFIR model was the ability to systematically identify cases which included data on the reflection and evaluation process of program implementation (sub-construct 5.4). Reflecting on the implementation process as it is on-going and following cessation is a critical step improving an organization's practice (Fixsen et al., 2005). Tier II program cases provided more detail about the reflection process and offered strategies which could be applied in future implementation settings. Working with organizations to reflect and improve their practice aligned to Domain 5 of the CFIR serves to identify areas of strengths and weakness which can be addressed to enhance program implementation (Damschroder et al., 2009).

Research Question 2: OAH Implementation Data and Implications

The OAH continues to demonstrate a strong commitment to decreasing unplanned pregnancy among adolescents to improve their overall health outcomes.

Replication and innovative TPP programs across the United States adhered to evidence-based or innovative program core components which sought to improve adolescent's health and decrease risks associated with unplanned pregnancy. Programs implemented with fidelity according to core program components have been shown as effective at changing adolescent's sexual risk taking behaviors and attitudes (Mathematica Policy Research, 2011; Kirby, 2007).

Among the first cohort of TPP program case reports, high program fidelity and dosage was reported across all 29 cases (The Policy & Research Group, 2015a; Coyle et al., 2016; Walker, Inoa, & Coppola, 2016; Seshadri et al., 2015; Crean, Seibold-Simpson, Jambon, & Kreipe, 2015; Daley et al., 2015; Francis, Woodford, & Kelsey, 2015; Philiber, Philiber, & Brown, 2015; Robinson, Kaufman, & Cahill, 2016; Herrling, 2015; Tucker, & Associates, 2015; Coyle, Potter, Glassman, McDade-Montez, & Unti, 2015; Philiber & Philiber, 2016; The Policy & Research Group, 2015b; Eichner, Salaway, Smith-Jones, & McCall, 2015; Martin, Hill, Nye, & Hollman-Billermeier, 2015; Kissinger et al., 2015; Slater, & Mitschke, 2015; Ruwe, McCloskey, Meyers, Prudent, & Foureau-Dorsinville, 2016; Calise, Chow, & Dore, 2015; Dierschke, Gelfond, Lowe, Schenken, & Plastino, 2015; Abe, Barker, Chan, & Eucogco, 2015; LaChausse, 2015; Advanced Empirical Solutions, 2015; Bull, Schmiege, & Devine, 2015; Carter, Beadnell, & Vankslyke, 2015; Cunningham, van Zyl, & Borders, 2016; Vyas, Wood, Landry, Douglass, & Fallon, 2015; Schwinn et al., 2015). Meeting the adherence and dosage threshold (at least 75% of adolescent must receive at least 75% of

program) was a requirement per the OAH funding contract (OAH, 2016c), and therefore, it is not surprising that all cases reported meeting the expectation.

The average staff (i.e., facilitator) rating was 4.75/5.0 for quality of interaction with participants among the majority of Tier I and II case reports. The case results describing youth engagement indicated that, overall, adolescents were highly engaged in program content and activities during traditional, face-to-face implementation (The Policy & Research Group, 2015a; Coyle et al., 2016; Walker, Inoa, & Coppola, 2016; Seshadri et al., 2015; Crean, Seibold-Simpson, Jambon, & Kreipe, 2015; Daley et al., 2015; Francis, Woodford, & Kelsey, 2015; Philiber, Philiber, & Brown, 2015; Robinson, Kaufman, & Cahill, 2016; Herrling, 2015; Tucker, & Associates, 2015; Coyle, Potter, Glassman, McDade-Montez, & Unti, 2015; Philiber & Philiber, 2016; The Policy & Research Group, 2015b) and experience some technical difficulties during online delivery programs (Eichner, Salaway, Smith-Jones, & McCall, 2015). The high levels of facilitator engagement and responsiveness from youth in the case reports could be attributed to adequate and in-depth facilitator training procedures and experiences with program core content prior to program implementation (Howard-Barr, Rienzo, Morgan, & James, 2005). Also, levels of facilitator interest and self-efficacy towards implementing the TPP program may have positively influence his/her ability to engage adolescents in meaningful discussion and activity during the program (Asheer, Berger, Mechstroth, Kisker, & Keating, 2014).

The OAH performance measure, Context, was the most varied among the Tier I and II case report findings. Other TPP programs (i.e., health education classes,

healthcare clinic instruction) were offered during the OAH project period and may have contributed to changes in adolescent's knowledge and skills regarding teen pregnancy prevention. Environmental barriers, such as staff turnover, restrictive educational policies, and transportation issues limited full TPP program implementation in many communities (Calise, Chow, & Dore, 2015) and time restrictions due to school or community events and schedules presented additional challenges organizations had to overcome (The Policy & Research Group, 2015b; Herrling, 2015; The Policy & Research Group, 2015a). Many of the barriers to implementation described in the case reports were outside the control of the organization and required adaptability and flexibility by program facilitators, staff, and participants throughout the process. As Walker et al., (2014) suggested, a pre-implementation phase prior to full-scale implementation may allow TPP program organizations to assess readiness and create contingency plans for barriers which may arise during implementation. (Walker, Mwaria, Coppola, & Chen, 2014).

Reviewing the OAH results from the cross-case analysis will not eliminate internal or external barriers to implementations, however, the findings present realistic barriers and solutions enacted by fellow TPP program facilitators and staff. The three OAH performance measures (Adherence, Quality, Context) findings complement a recent special edition published in the American Journal of Public Health [AJPH] (Morabia, 2016) titled *Building Evidence to Prevent Adolescent Pregnancy* which summarized results across 41 program impact evaluations assessing the effectiveness of replicated and innovative TPP programs among adolescents.

Exploratory Themes and Implications

The exploratory codes and major themes identified in this study illustrated the TPP program *practitioner* perspective and feedback which was critical for program planning, implementation, and evaluation. While overlap between the theoretical domains of the CFIR model (i.e., Organization (2), Community (3), and Facilitator (4)) and the required data for OAH performance measures (i.e., Quality, Context) existed, without inductively investigating each case important insights from the practitioner perspective on implementing TPP programs may have been missed.

First, major themes III and IV provided salient data which reflects the implementation experiences of organization and school leaders during the 2010-02104 OAH TPP program. Results from Theme III: Implementation Methods, sub-theme Facilitator training procedures complements research from Wight & Buston (2003) on the importance of tailoring facilitator (i.e., teacher) training materials to the unique challenges, both personal and structural, that facilitators face in delivering sexuality education programming. Throughout training experiences, TPP program implementation staff and evaluators must provide facilitators with opportunities to self-reflect on personal values, core beliefs, and attitudes related to teen pregnancy and adolescent sexual health because these elements affect facilitator's interest, motives, and self-efficacy towards program implementation (Wight & Buston, 2003). Moreover, the need for on-going technical assistance for facilitators, as reported by Coyle, Potter, Glassman, McDade-Montez, Unit (2015) who evaluated It's Your Game in South Carolina Seshadrio et al. (2015) who evaluated The Teen Outreach Program in Chicago, Illinois,

illustrated the importance of content and pedagogy preparation as a key components to efficacious delivery of sexuality education in teen pregnancy prevention. This implication also supports research by Howard-Barr, Rienzo, Morgan, & James (2005) on professional preparation among school health teachers implementing sexuality education.

Emergent in the environmental barriers sub-theme were issues of organizational change (Crean, Seibold-Simpson, Jambon, & Kreipe, 2015), time restrictions (The Policy & Research Group, 2015b; Herrling, 2015; The Policy & Research Group, 2015a), and policy mandates (Seshadri et al., 2015) which increased difficultly toward implementation among Tier I and Tier II program cases. Often times, organizational changes such as staff or leadership turn-over, are outside the control of the program implementation staff and facilitators (Fixsen et al., 2005), however have direct implications on program participants (Advocates for Youth, 2008). When facilitators cannot be retained, implementation adherence and dosage suffer which leads to decreases in opportunities for adolescents to gain valuable knowledge and skills (Tevendale, Fuller, House, Dee, & Koumans, 2017b). Creating strategies, similar to the OAH mandated phase-in implementation period, allows program implementation staff and facilitators to develop relationships with key community and school leaders and develop contingency plans for instances when turn-over or withdraw occur (Advocates for Youth, 2008).

Study Limitations

This study is not without limitations which must be addressed. First, the goal of this qualitative cross-case analyses was to uncover salient patterns among a case sample of implemented TPP programs. The results are not generalizable to every teen pregnancy prevention program, regardless of setting (e.g., school, community center, faith-based organization), but rather present themes which are transferable and that may inform other adolescent health and teen pregnancy program implementation in the future. Researcher bias and positionality within the critical realism paradigm present a limitation which should be considered when reviewing results and conclusions derived from this study. Lastly, given the data sources used in this cross-case analyses (OAH TPP evaluation reports), the research team was limited by the type and amount of data reported in the OAH TPP Program grantee reports. The report structure and required performance measures and collection elements present a level of bias which must be acknowledged when interpreting findings.

Conclusions

Implementation science, regardless of health content area, requires a triangulated approach using theory, research, and practice to enhance efficacy and translation. Within adolescent health and teen pregnancy prevention, support is growing to evaluate implementation theories and practices which contribute knowledge and insights to close gaps in research-to-practice translation. Conducting research assessing program implementation rigor and results and disseminating information about barriers and

facilitators influencing implementation can help communities select and adopt programs which are evidence-based and/or tailored to their target population's needs. Integrating theoretical frameworks, evidence-based or innovative practices, and feedback from community and school implementation partners enhances the field's understanding of implementation science and contributes to improve practices aimed at helping adolescents remain healthy and safe.

CHAPTER IV

SCHOOL AND COMMUNITY-BASED PROGRAM IMPLEMENTATION AS A COMPLEX SYSTEM: USING QUALITATIVE SYSTEM DYNAMICS MODELING TO UNDERSTAND THE FORCES INFLUENCING THE IMPLEMENTATION OF TEEN PREGNANCY PREVENTION PROGRAMS

Introduction

Implementing adolescent health programs is a complex process which requires multi-level factors working in synergy (Kirby, 2007). Specific to sexuality education and teen pregnancy prevention (TPP), programs involve adolescents, adults, parents, community stakeholders and are implemented in various settings like schools (i.e., middle/high), after-school programs, community centers, faith-based organizations, and via online and mobile technologies (National Campaign to Prevent Teen Pregnancy, 2016; Kirby, 2007) to reach adolescents where they live, play, and work. To capture the complexity of all moving parts associated with TPP program implementation (e.g., target population needs, facilitator training procedures, participant retention strategies, or curriculum core content), ecological or systems perspectives can help individuals and communities identify marco- and mico-level factors and feedback relationships which affect implementation and possible intervention points to change the broad system where appropriate (Latkin, Weeks, Glasman, Galletly, & Albarracin, 2010).

As TPP program implementation is a complex system which evolves, adapts, and changes over time, systems-grounded approaches can help improve implementation

practices and increase successful outcomes. Integrating systems approaches which challenge individual or community norms and mental models (i.e., cognitive constructions of the world) about adolescent sexuality and deconstructing the nonlinear, complex nature of implementing programs in diverse settings can propel efforts already underway to improve sexual health outcomes and prevent teen unplanned pregnancy (Mueller et al., 2017; Collins et al., 2012; Wandersman et al., 2008).

Thus, the objective of this study was to present a systems-based conceptualization of *Teen Pregnancy Prevention Program Implementation* (TPPPI) by developing a qualitative system dynamics model (SDM) which delineates the complex forces influencing teen pregnancy prevention program implementation in school and community settings. The study integrated evidence from two sources: the extant literature on TPPPI, and findings from a cross-case analysis using the 2010-2014 Office of Adolescent Health (OAH) Teen Pregnancy Prevention (TPP) Program Tier I Replication programs and Tier II Research and Demonstration. To create a boundary model map of implementation dynamics.

Teen Pregnancy Prevention Program Implementation

Rates of teen pregnancy and birth in the United States remain highest among all other industrialized nations (Hamilton, Martin, Osterman, & Curtin, 2014). Elevated rates propel a need for TPP to be among the top priorities on the public health agenda. Disparities among racial/ethnic groups, age, geographic location, and sexual orientation exacerbate unanswered questions and problems regarding adolescent sexual behavior, suggesting innovative approaches are needed to find solutions (Teitelman, Bohinski, &

Boente, 2009). Disparities in teen and unplanned pregnancy can be explained by reviewing two gaps in professional research and practice including 1) limited, but growing evidence which investigates TPP program implementation practices and 2) over-reliance on traditional, linear approaches to explain factors influencing TPP program implementation.

Targeted efforts to understand and enhance the evidence base among teen pregnancy prevention program implementation are on-going. Studying implementation theory, research, and practice among current TPP programs provides a platform to answer questions and generate solutions which could increase program effectiveness. Implementation science investigates the systematic uptake of proven clinical treatment, practice, organization, and management interventions into routine practice to improve health (Durlak & DuPre, 2008; Castro, Barrera, & Martinez Jr, C.R, 2004). Investigating implementation practices and measures helps identify health professionals and organizations as key sources of variance, requiring improved empirical and theoretical understanding before program effects can be reliably achieved (Bass & Judge, 2010; Wandersman et al., 2008).

TPP program implementation evidence, which is strongly associated with program effectiveness and outcomes (Huberman & Advocates for Youth, 2004; Kirby, 2007; Santelli, 2008), describe an iterative, complex process involving internal factors (e.g., organization managers or facilitators, adolescents) and external factors (e.g., hesitation from community political leaders or parents) to the implementation environment which shape implementation-level outcomes. While program implementers

are integrating characteristics of effective programs (e.g., medically accurate content, trained facilitators), population-specific needs assessment, theoretical and/or logic models, behavioral/social science research methods, factors necessary for behavior change (Kirby, 2007); ecological and contextual factors, such as resource constraints, lack of funding, organizational capacity and support as well as curriculum adaptations are cited as barriers to effective implementation among community-based pregnancy prevention programs (Ott, Rouse, Resseguie, Smith, & Woodcox, 2011).

Limitations of Prevailing TPP Program Approaches

The majority of research in TPP is characterized by traditional, reductionist approaches used to understand design, implementation, and evaluation of program effects (Kirby, 2007). The traditional epistemological approach—focused on linear thinking—dissects multilevel factors (e.g., knowledge/attitudes, behavioral skills, access to contraception) influencing adolescent sexual decision-making in attempts to prevent negative sexual behaviors and outcomes. Carey et al. (2015) and Luke & Stamatakis (2012) argue breaking factors into smaller chunks may not be the most effective way to address the complex interplay between intra-, inter-, and community influences on adolescents' sexuality over time (Tolman, Striepe, & Harmon, 2003). Furthermore, issues of appropriate research design, sampling technique and size, and statistical analysis aimed at implementation and evaluation remain rooted in traditional, reductionist action (Kirby, 2007; Tolman, Striepe, & Harmon, 2003) and limit programs' abilities to understand and serve the dynamic needs of adolescents.

Complex Systems and System Dynamics Modeling (SDM)

Broadly defined, systems science is a class of analytic approaches which seeks to uncover the behaviors of complex systems, encourages a rethinking of 'how pieces of the whole' interact with one another, and examines the dynamic relationships between elements and levels in a system (Atwood, Pedler, Pritchard, & Wilkinson, 2003; Hawe, Shiell, & Riley, 2009; Trochim, Cabrera, Milstein, Gallagher, & Leischow, 2006). Research using systems-grounded approaches are critical to advance the public's mental models (i.e., personal understanding and thinking) about individual and community health outcomes (Peters, 2014; Mabry, Olster, Morgan, & Abrams, 2008).

Methodological approaches such as System Dynamics Models (SDM)— comprised of causal loop diagrams (CLD) or stock-and-flow (SF) accumulations— and Agent-Based Modeling (ABM) provide opportunities to simulate data about reality (Sterman, 2000). Specifically, System Dynamics is a method and computational modeling technique used to frame, understand, and discuss complex issues and problems (Trochim et al., 2006). Many of the primary components to System Dynamics is the underlying feedback mechanisms which influence system structure and behavior through time (Sterman, 2000; Richardson, 2011). Feedback loops or linkages among components help to define model boundaries (i.e., included and excluded variables) and provide insights into *cause and effect* relationships influencing behavior (Sterman, 2000). Feedback within dynamic systems—internal or external factors influencing TPP program implementation— demonstrates an initial cause ripple through a chain of

causation which re-affects the initial variable or factor driving behavior (Meadows, 2008; Sterman, 2000).

Over the past decade, there has been rapid growth and interest in applying systems science theories and approaches to public health research (Carey et al., 2015; Luke & Stamatakis, 2012). System dynamics modeling has been applied to complex health problems (e.g., cardiovascular disease prevention, smoking cessation) to help frame, understand, and dissect factors and systems affecting outcomes (Orenstein et al., 2008; Homer & Hirsch, 2006; Loyo et al., 2013). Burke et al. (2015), for example, used system dynamics modeling to understand case study findings about community strategic planning and evaluation for cardiovascular disease (CVD) prevention and policy regulation. Researchers applied the Centers for Disease Control and Prevention's (CDC) and National Institutes of Health's (NIH) Prevention Impacts Simulation Model (PRISM), an integrated health policy simulation model, with community stakeholders to address "(1) How does local context affect the major risk factors for CVD, population health, and costs?; and (2) How might local health leaders better choose their policy efforts given limited resources?" (Burke et al., 2015, p. 284).

Evidence integrating systems science and thinking is emerging within TPP research and practice. Theoretical contributions from Wandersman et al. (2008) posit an Interactive Systems Framework (ISF) for Dissemination and Implementation aimed at bridging the gap between prevention research and practice. The ISF has been applied to CDC HIV/AIDS preventative initiatives (Collins et al., 2012) and community-readiness for the adoption of school-based prevention programs (Flaspohler, Meehan, Maras, &

Keller, 2012). Research from Lewis et al. (2012) and Lesesne et al. (2008) report the ISF as helpful to in strengthening arguments for science-based (i.e., evidence-based) teen pregnancy prevention programs. Developers and users of ISF argue supportive system partnerships are grossly under-researched and suggest mechanisms within the Synthesis and Translations Systems in ISF to improve TPP and STI/HIV programming. Work by Orr & Evans (2011) contributed an Agent-Based Model—a methodological approach from systems and complexity science (Sterman, 2000) — to understand the long-term diffusion of adolescent sexual initiation patterns. This innovative research applied ABM to quantitatively model the diffusion of sexual initiation behaviors among adolescents and identified intervention points which functioned to produce measurable effects on system behavior (Orr & Evans, 2011).

Methods

System Dynamics Rationale

System dynamics was chosen for modeling teen pregnancy prevention program implementation for several reasons. First, system dynamics helps to explain dynamic phenomena using causal feedback relationships and stock-and-flow accumulations (Meadows, 2008; Sterman, 2000). Since TPP program implementation is influenced by internal (i.e., organizational characteristics) and external factors (i.e., socio-political forces) which drive implementation practice in school and community settings, and using SDM allows researchers to capture and study factors' dynamic interconnectedness over time. Modeling the effects from internal and external factors on implementation practices (i.e., adherence, dosage) can help identify dominant feedback loops responsible

for producing positive and negative system behavior (Meadows, 2008; Sterman, 2000). Researchers can then use the preliminary qualitative mapping of TPP program implementation results as the base to calibrate and simulate a SDM in future studies (Burke et al., 2015).

Model Boundaries and Variables

In the absence of prior efforts to compile a comprehensive systems map which discusses TPP program implementation practices, we selected a broad model boundary (theoretical frameworks, procedural steps, and empirical implementation evidence) to avoid focusing on one narrow area of influence (e.g., facilitator knowledge and attitudes). The qualitative synthesis of peer-reviewed evidence (Chapter II) and results from the cross-case investigation (Chapter III) informed the process for setting the boundaries for the TPPPI model. Data used to construct the systems map included empirical evidence from the peer-reviewed literature describing TPP program implementation, as well as results from the Office of Adolescent Health (OAH) 2010-2014 cohort of Teen Pregnancy Prevention Programs (Tier I Replication Programs, and Tier II Research and Demonstration Programs). Results from a scoping literature review (n = 23 articles) and OAH Tier I and II programs case study (n = 29 reports) synthesized the theoretical applications, procedural steps, and empirical results describing TPPPI and helped to identify key dominant factors used to construct the TPPPI feedback model. The model includes endogenous (i.e., feedback) and exogenous (i.e., non-feedback) variables which influence TPP program implementation (Wittenborn, Rahmandad, Rick, & Hosseinichimeh, 2016).

Model Iterations

Constructing the model involved an iterative, participatory approach to identify and frame the problem, select key causal factors, and determine the strength and relationships among variables (Hovmand, 2013; Richardson, 2011). A team of system dynamics modelers collaborated in developing and refining the TPPPI model through various one-on-one feedback sessions. First, we began by evaluating the literature and empirical TPP program results to determine salient factors, or the most dominant drivers of TPPPI. Next, through on-going discussion and participatory modeling sessions, we deconstructed feedback loop relationships to confirm each endogenous variable, its relationship to other factors in the model, and the polarity (+, -) assigned to each relationship. Lastly, after final revisions, the database used to create the model included 51 publications which reported quantitative or qualitative teen pregnancy prevention program implementation results. The TPPPI map was built and refined using Vensim modeling software.

Understanding Model Feedback

To understand systematic conditions (i.e., pertaining to the system model), feedback loops are likely to play a key role in explaining the observed phenomena with TPP program implementation. Positive (Reinforcing) and Negative (Balancing) loops are important for understanding system behavior change over time. Reinforcing feedbacks loops describe how the impact of a small increase in one variable, once traced along the whole loop, leads to a further increase in the initial variable. In social science research reinforcing loops are referred to as ‘vicious’ cycles and often demonstrate

positive polarity (+) (Sterman, 2000; Wittenborn, Rahmandad, Rick, & Hosseinichimeh, 2016). Conversely, in balancing feedback loops an increase in one variable propagates through the whole loop, then returns causing a decrease in the initial variable and vice versa. Balancing loops within the system serve to disrupt the 'virtuous' nature of the cycle, causing oscillating behavior patterns and demonstrate negative (-) polarity (Sterman, 2000). The TPPPI model identifies and describes high impact intervention leverage points that stakeholders can mobilize to improve implementation of teen pregnancy prevention programs. Leverage points within the system provide points of entry where external forces (i.e., intervention) can take place to alter the state of the system. Leverage points are targets for interventions to change the systems' behavior and can enhance outcomes when inserted within a reinforcing and/or balancing loop (Meadow, 2008; Sterman, 2000).

Findings

The TPPPI model identifies five main reinforcing loops (R1, R2, R3, R4, and R5) which capture the dynamic hypotheses of teen pregnancy prevention program implementation. First, we discuss the dominant drivers of TPPPI (See Figure 10). Next, the full feedback map which incorporates all reinforcing feedback loops influencing implementation is presented (See Figure 11). This model focuses discussion on reinforcing loops affecting TPPPI, however we acknowledge balancing (homeostatic) feedback relationships do exist within the system. Third, we deconstruct each reinforcing loop (R1–5) using evidence to demonstrate the causal connections between each variable (Figures 12 - 16). Within each reinforcing loop endogenous and exogenous variables are

included, however the strongest and dominant loops are presented in bolded text. Lastly, the full system map is presented again with intervention leverage points accompanying each reinforcing loop (Figure 17).

Dominant Drivers of TPPPI

Levels of teen pregnancy prevention program implementation are centrally driven by two *Reinforcing Loops (Internal Setting, External Setting*) which include five dominant factors: Organizational Capacity, Facilitator Knowledge/Skills, Student Engagement and Participation, and State/District Sexuality Education Policy. Taken in unison, these factors contribute to TPPPI in reinforcing and cyclic ways. (See Figure 10).

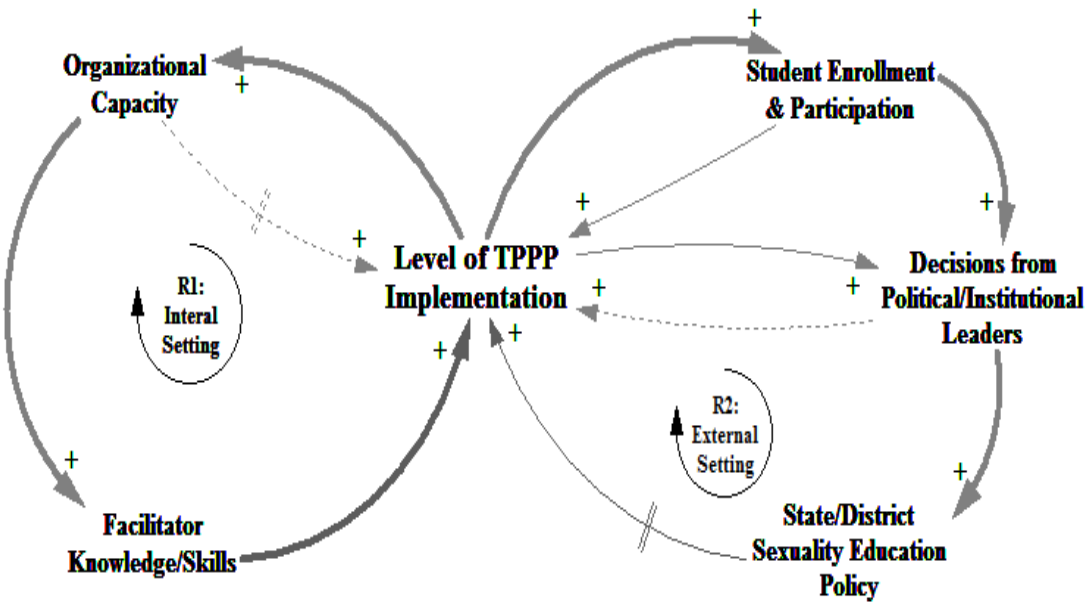

Figure 10. Dominant Factors Impacting TPPPI

Reinforcing Loop: Internal Setting. This model depicts factors which are central to the organization that is implementing the TPP program (e.g., Advocate's for Youth, Louisiana Public Health Institutes). As the amount of program implementation increases the youth-serving organization must increase its resources, funding, and staff infrastructure to meet the demand (Demby et al., 2014; Walker, Inoa, Coppola, 2016). With time, increased resource allocation to build organizational capacity, leads to improved implementations practices and outcomes. Better organizational capacity

includes recruiting and training more facilitators who demonstrate content mastery and effective pedagogical skills. Such individuals directly deliver program content, develop and sustain relationships with participants and staff, as well as provide valuable input during and after the implementation period (Plastino, Quinlan, Todd, & Tevendale, 2017; Potter et al., 2016; LaChausse, Clark, & Chapple, 2014; Cronin, Heflin, & Price, 2014). Facilitators must be knowledgeable on program objectives, lesson content and activities, and assessment strategies used to measure effects. Greater facilitator expertise and skills lead to increases in TPP program implementation (Potter et al., 2016; The Policy & Research Group, 2015a; Herrling, 2015), thus closing the *Reinforcing Loop: Internal Setting*.

Reinforcing Loop: External Setting. This model describes variables outside core organizational functionality, which directly influence TPPPI. Program implementation levels increase when students participate, and the presence of enrolled and engaged students serves to increase levels of TPPPI. Most notably, as students become engaged with program content, richer learning, discussion, and activity occur (Philliber, Philliber, & Brown, 2015). Engagement from students also triggers the decision-making processes of influential leaders in the school and/or community to (a) support further implementation practice which changes amount of TPPPI, and/or (b) be more likely to advocate and support state/district sexuality education policy which increases levels of TPPPI (Martin, Hill, Nye, & Hollman-Billmeier, 2015; LaChausse, 2015).

Lastly, considering a multilevel, ecological approach to health promotion (McLeroy, Bibeau, & Glanz, 1988) policy regulations and actions surrounding sexuality education and teen pregnancy prevention are the final factor in the *R2 loop* (LaChausse, 2015; Martin, Hill, Nye, & Hollman-Billmeier, 2015; Slater, & Mitschke, 2015). State and/or district educational polices regulate the type of TPP programs (i.e., abstinence-only, abstinence-plus, comprehensive) approved for implementation, thus dictating program selection and implementation fidelity levels for schools and community partners (LaChausse, 2015; Martin, Hill, Nye, & Hollman-Billmeier, 2015; Slater, & Mitschke, 2015). For example, supportive state/district policies serve to increase levels of TPPPI or vice versa with restrictive state/district policies decreasing TPPPI over time (Dierschke, Gelfond, Lowe, Schenken, & Plastino, 2015). This final connective relationship between state/district sexuality education policy and amount of TPPPI closes the *Reinforcing Loop: External Environment (R2).*

Full TPPPI Feedback Model

Presented below in Figure 11 is the full TPPPI feedback model which includes dominant drivers, relationship arrows and polarity between variables, five labeled reinforcing loops, and exogenous (i.e., non-feedback) variables which impact implementation. The map is color coded according the factor cluster families: Grey cluster is organizational-related factors; Blue cluster is facilitator-related factors; Orange cluster is socio/political-related factors; and Pink cluster is student engagement-related factors. In order to read the map begin by locating the initial stock titled *TPPP*

Implementation (>75%)[2], and select one family color cluster and variable. Follow the directional arrows, or connectors, from one variable to another. Note the polarity (+,-) on each arrow head, as this symbol denotes the direction of the relationship between the variables (i.e., + associated variables behave in the same direction, - associated variables behave in opposite directions). The bold arrows demonstrate the strongest, causal pathway (⟶), while the dashed arrows illustrate the underlying relationship between the cluster's dominant driver and level of TPPPI over time (⇢). Specific variable pathways are discussed according to each color cluster in the sections below. For example, in the grey cluster, when an organization's capacity (i.e., adequate resources to support implementation) increases this leads to an increase in the amount of training and technical assistance which can be provided to the facilitator and/or implementation partner. Variable names are derived from the peer-review literature, but note the acronym, CFIR as it is attached to select variables in the map. The Consolidated Framework for Implementation Research (CFIR) is one of the theoretical frameworks used to evaluate the TPP program implementation literature and subsequently was used to label variables in this model (Damschroder et al., 2009). All five reinforcing loops are titled, positioned within a small clockwise circle, and are explained in detail below. In sum, all the variables in this map work synergistically to drive teen pregnancy prevention program implementation above the 75% fidelity level as required by federal funding guidelines (OAH, 2016a).

[2] The Office of Adolescent Health (OAH) required all 2010-2014 Tier I and II grantees to report implementation-level data for >75% of TPP program. This threshold is presented as the primary stock in the qualitative system dynamics model.

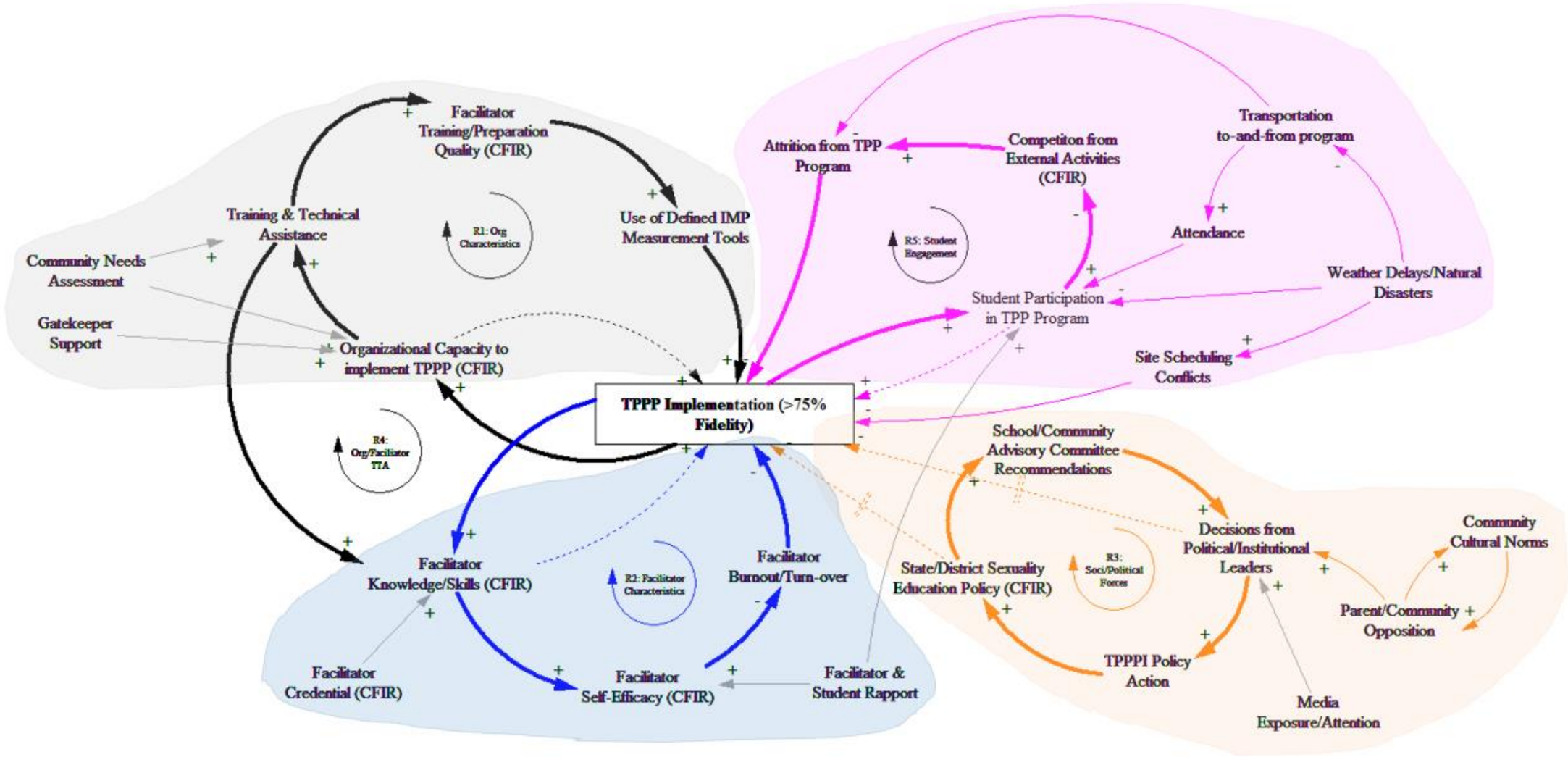

Figure 11. Full TPPPI Feedback Model

Reinforcing Loops (R1-5)

Reinforcing Loop R1 Org Characteristics. Describes the entity who is carrying out the TPP program implementation and includes the following salient factors: organizational capacity, training and technical assistance, facilitator training/preparation quality, and use of defined implementation (IMP) measurement tools. (See Figure 12).

Organizational capacity is defined as the ability to fulfil program goals and objectives, and utilize internal and external supports to develop, maintain, and sustain programs (Labonte & Laverack, 2001). A primary outcome of organizational capacity is creating and providing training and technical assistance for community-based partners to implement health programs (Romero et al., 2017; Mueller et al., 2017; Herrling, 2015; The Policy & Research Group, 2015b; Seshadri et al., 2015). Within teen pregnancy prevention, as the organizational capacity and infrastructure improve, implementation practices (i.e., adherence, dosage, quality) also get better. Increased capacity allows organizations to provide tailored training and technical assistance to implementation partners, thus improving overall implementation practice (Cronin, Heflin, & Price, 2014; Potter et al., 2016; LaChausse, Clark, & Chapple, 2014; Plastino, Quinlan, Todd, & Tevendale, 2017). Increased fidelity to program goals, objectives, and content due to appropriate organizational capacity and on-going technical assistance has been documented by federally funded TPP evidence-based and innovative programs (Farb & Margolis, 2016).

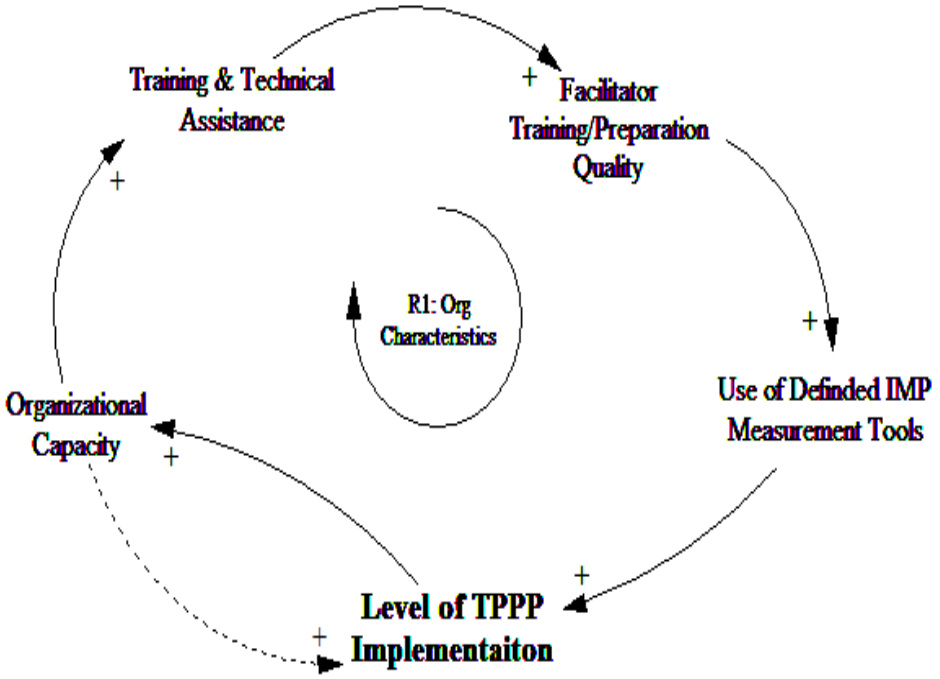

Figure 12. Organization Characteristics

Tailored technical assistance leads to higher quality, more efficacious facilitator training and preparatory materials (Cronin, Heflin, & Price, 2014; Potter et al., 2016; LaChausse, Clark, & Chapple, 2014; Plastino, Quinlan, Todd, & Tevendale, 2017). Providing training resources which are specific to the TPP program, target population, and current organizational needs using a variety of pedagogical strategies to cover intervention core components, better prepares program facilitators to deliver and assess their practice (Fixen et al., 2005).

One of the core components involved in TPPPI is the use of measurement tools to assess program effects (Office of Adolescent Health, 2016a; 2016b; 2016c). Measurement tools include fidelity monitoring logs, session observations forms, facilitator self-report surveys, on-site or electronic conference meetings, or key informant interviews and focus groups. During the facilitator preparation period, mastery of measurement tools and strategies can improve efficacious use during the actual implementation (Tevendale, Fuller, House, Dee, & Koumans, 2017b; Herrling, 2015; Cronin, Heflin, & Price, 2014). When facilitators are trained using the implementation measurement tools, their instruction and fidelity to intervention core components improves and leads to improvements in levels of TPPPI (Tevendale, Fuller, House, Dee, & Koumans, 2017b; Potter et al., 2016; The Policy & Research Group, 2015a; Herrling, 2015; Cronin, Heflin, & Price, 2014).

Reinforcing loop R2 Facilitator Characteristics. Presents a reinforcing loop which describes characteristics of the person who is delivering the TPP program content. This dominant loop strengthens the level of TPPPI using several salient factors. (See Figure 13).

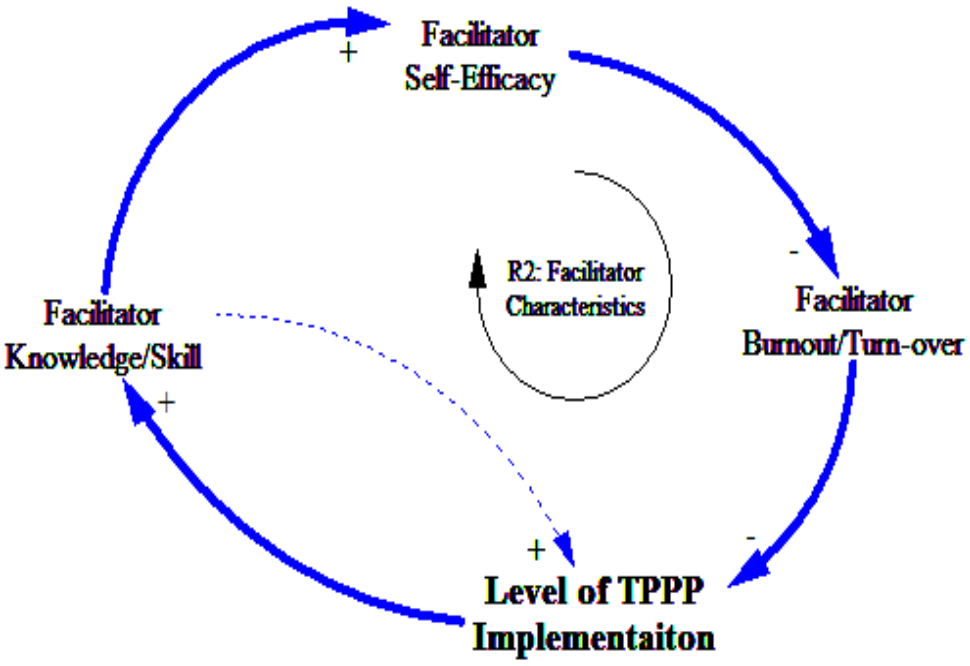

Figure 13. Facilitator Characteristics

First, the knowledge and skills of the facilitator serve to increase the perceived self-efficacy of the person (Potter et al., 2016; The Policy & Research Group, 2015a; Herrling, 2015). As individuals become more skilled with program content, activity facilitation, classroom management strategies, and assessment techniques, his/her efficacy to implement the TPP program improves (Gilmore et al., 2015; Asheer, Berger, Meckstroth, Kisker, & Keating, 2014; LaChausse, Clark, & Chapple, 2014). An inverse relationship between facilitate self-efficacy and burnout exists, and posits: In the

presence of higher self-efficacy, facilitators are less likely to experience burnout or withdrawal from the program (Gilmore et al., 2015; Asheer, Berger, Meckstroth, Kisker, & Keating, 2014; LaChausse, Clark, & Chapple, 2014). With lower rates of facilitator turn-over (i.e., abrupt or planned withdrawal) levels of TPP program implementation improve (Haignere, Culhane, Balsley, & Legos, 1996). The system continues to reinforce its behavior of improved TPP program implementation as facilitator knowledge, skills, and self-efficacy outweigh burnout.

Reinforcing Loop R3 Socio/Political Forces. This model illustrates social and political factors, outside the organizational setting, which influence levels of implementation. To understand R3, one can begin with State/District Sexuality Education Policies and work around the connection chain. (See Figure 14).

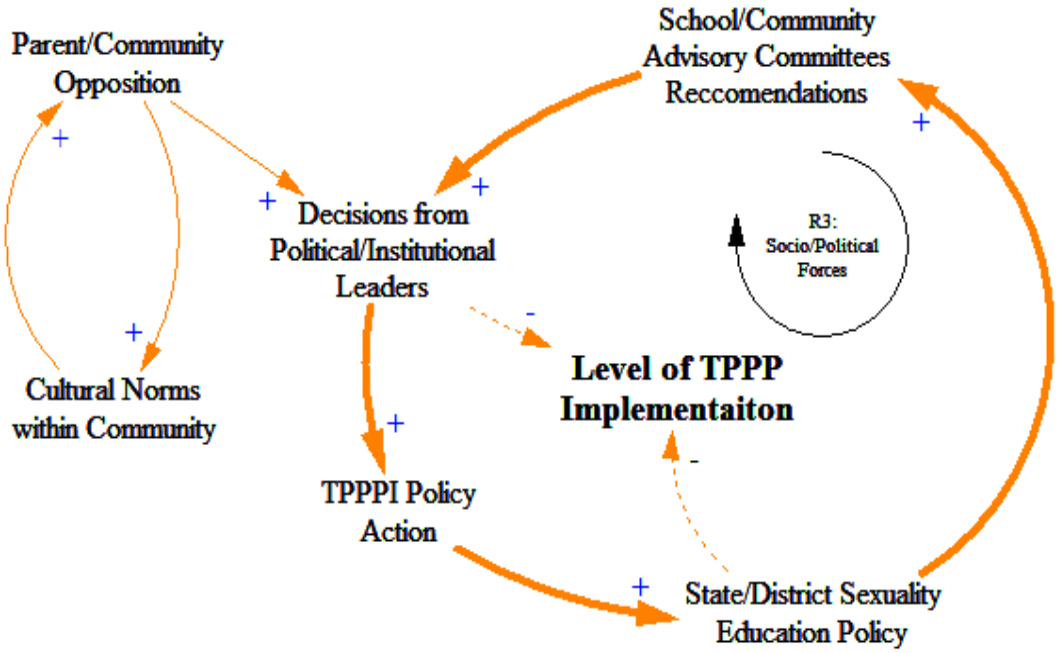

Figure 14. Socio/Political Forces

As cited in the Figure 10 diagram, policy regulations such as universal abstinence-only curriculum mandates or lack of approval for condom demonstrations accompanying teen pregnancy prevention programs inhibit full fidelity of TPPPI (Feldman, Farb, & Margolis, 2016; Martin, Hill, Nye, & Hollman-Billmeier, 2015; Slater, & Mitschke, 2015; LaChausse, 2015; Dierschke, Gelfond, Lowe, Schenken, &

Plastino, 2015). State/District policies surrounding sexuality education set the agenda for School/Community Advisory Committees to make practice recommendations or suggestion for change within their environments. These recommendations are either activated or dismissed by key leaders within the school or community setting negatively affecting TPPPI levels (-) or positively facilitating policy action (+). TPPPI policy action and advocacy lead to continued support or establishment of new policies regulation sexuality education among adolescent populations.

Decision-making patterns of political and institutional leaders are influenced by multiple groups, however, School/Community Advisory Committee recommendations and opposition or concern from parent and community constituents serve to enhance that decision-making (Martin, Hill, Nye, & Hollman-Billmeier, 2015; LaChausse, 2015). As depicted in the diagram, Parental/Community Oppression is increased when cultural norms within the community are supportive of such viewpoints (Coyle et al., 2016; Coyle, Potter, Glassman, McDade-Montez, & Unti, 2015; Martin, Hill, Nye, & Hollman-Billmeier, 2015; Carter, Beadnell, & Vanslyke, 2015), thus leading school board members, city officials, and other high-ranking individuals to apply bias to their objective decision-making patterns which can influence TPPPI policy or action.

Reinforcing loop R4 Organization & Facilitator Training Relationship represents the relationships between R1 and R2 with regard to an organization's capacities to provide training and support for program facilitators. As one of the dominant drivers of TPPPI, Facilitator Knowledge/Skill serves as the start and end point in understanding this reinforcing loop. (See Figure 15).

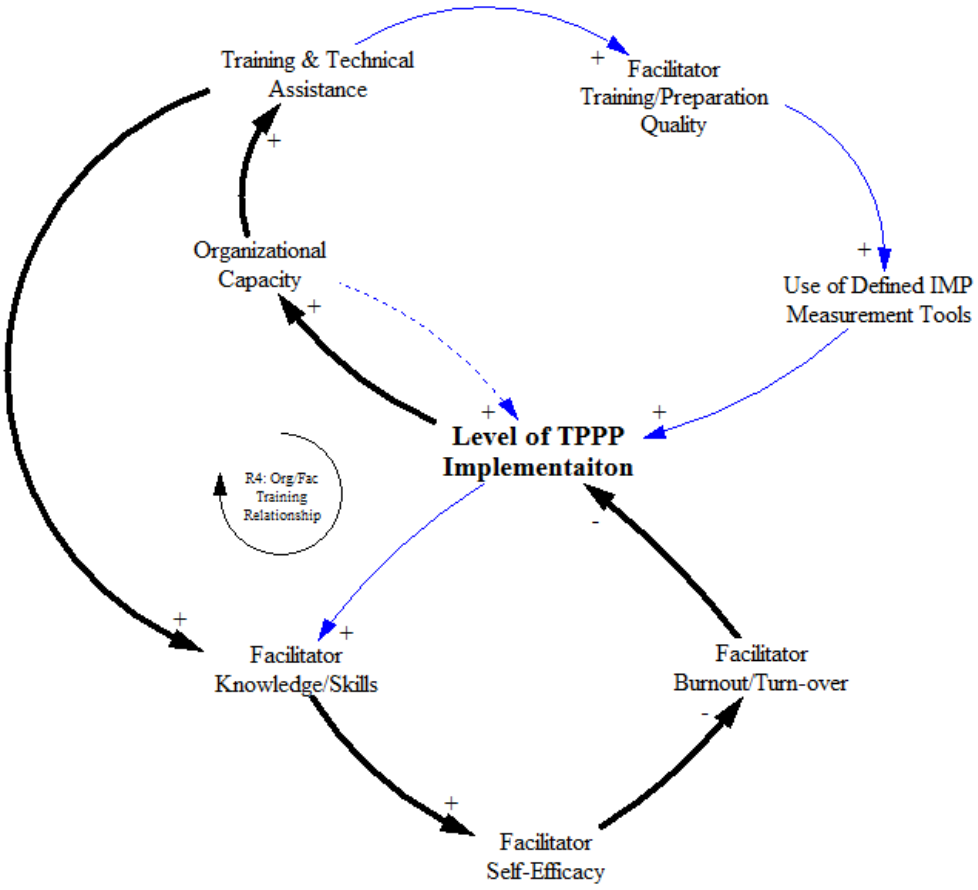

Figure 15. Organization & Facilitator Training Relationship

As described in the R2 diagram, advances in a facilitators' knowledge and skills function to increase perceived self-efficacy (Potter et al., 2016; The Policy & Research Group, 2015a; Herrling, 2015). As an individual becomes more skilled with implementation core components, his/her efficacy to implement the TPP program improves (Gilmore et al., 2015; Asheer, Berger, Meckstroth, Kisker, & Keating, 2014; LaChausse, Clark, & Chapple, 2014; Haignere, Culhane, Balsley, & Legos, 1996). Increased facilitator self-efficacy leads to less burnout and turn-over during the program. (Gilmore et al., 2015; Asheer, Berger, Meckstroth, Kisker, & Keating, 2014; LaChausse, Clark, & Chapple, 2014; Haignere, Culhane, Balsley, & Legos, 1996). With lower rates of facilitator turn-over (i.e., abrupt or planned withdrawal) levels of TPP program implementation improve. The second half of the Rein*forcing Loop Organization & Facilitator Training Relationship* then continues along the same trajectory described in Figure 15.

Reinforcing Loop R5 Student Engagement. This model illustrates the last dominant driver of TPPPI, Student Engagement. (See Figure 16). As programs experience increased amounts of implementation (i.e., offering additional sessions, extending lesson times) participation from students also increased (Philliber, Philliber, & Brown, 2015). Students who are actively participating and interested in the program sessions report less distraction from external, outside groups. Competition from other activities (i.e., Boys/Girls Club, summer employment) decreases when students are participating in the TPP program (Robinson, Seibold-Simpson, Crean, & Spruille-White, 2016; Bull, Schmiege, & Devine, 2015; Lesser et al., 2005) and this condition also

decreases attrition issues for the TPP program (Abe, Barker, Chan, & Eucogco, 2015; Calise, Chow, & Doré, 2015; Cunningham, van Zyl, & Borders, 2016; Bull, Schmiege, & Devine, 2015; Advanced Empirical Solutions, 2015; Philliber, & Philliber, 2016). To complete the dominant connection, one can assert when attrition from the TPP program is low, due to non- competition from other activities, the level of TPP program implementation increases because more students are present to learn and engage with the content.

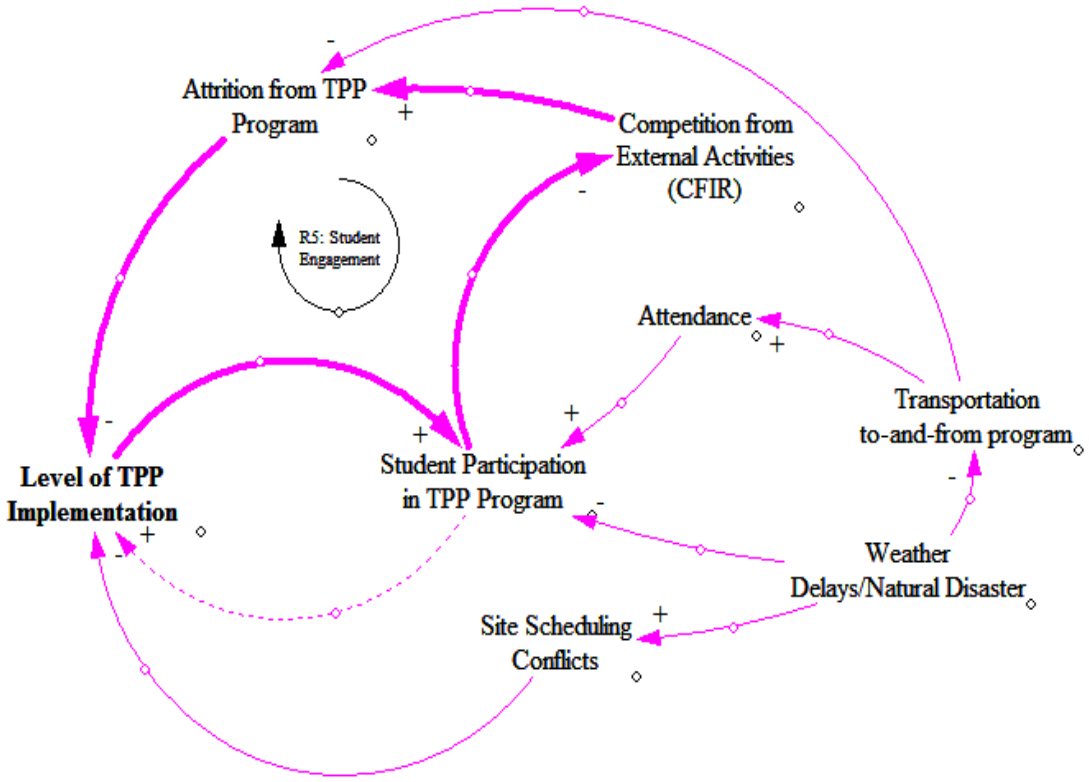

Figure 16. Student Engagement

Exogenous variables which impact the level of TPPPI due to student engagement include: student attendance, transportation to-and-from program, weather delays/natural disasters, and site scheduling conflicts. These variables are largely due to uncontrollable, environmental forces but remain influential on overall TPPPI. As unforeseen weather delays or natural disasters occur (Calise, Chow, & Doré, 2015; Seshadri et al., 2015; Coyle et al., 2016; Robinson, Kaufman, & Cahill, 2016; Crean, Seibold-Simpson, Jambon, & Kreipe, 2015; Slater, & Mitschke, 2015) transportation to-and-from the program decreases causing attendance issues to increase, and site scheduling conflicts to arise. For example, weather delays effect academic periods, test remediation, and prep-rally schedules which can impede successful implementation of TPP programs (Calise, Chow, & Doré, 2015; Cunningham, van Zyl, & Borders, 2016; Daley et al., 2015; Herrling, 2015; Workman, Flynn, Kenison, & Prince, 2015; Seshadri et al., 2015 Sharpio, & Kisker, 2012). Scheduling conflicts themselves, separate from weather-induced problems, present unique challenges for facilitators and organizations implementing programs with full fidelity; the arrow and negative (-) sign label communicate this inverse (opposite) relationships.

Additionally, transportation to-and-from TPP programs has been cited as a major barrier to participation by facilitators and parents of driving and non-driving age adolescents (Robinson, Seibold-Simpson, Crean, & Spruille-White, 2016; Asheer, Berger, Meckstroth, Kisker, & Keating, 2014; Demby et al., 2014). To mitigate this barrier, the majority of recently funded TPP programs support transportation for participants, however, when transportation services are effected program organizers and

facilitators report poor attendance and higher attrition from the programs as likely outcomes (Robinson, Seibold-Simpson, Crean, & Spruille-White, 2016; Bull, Schmiege, & Devine, 2015; Calise, Chow, & Doré, 2015; Crean, Seibold-Simpson, Jambon, & Kreipe, 2015; Herrling, 2015; Martin, Hill, Nye, & Hollman-Billmeier, 2015; Schwinn et al., 2015; Asheer, Berger, Meckstroth, Kisker, & Keating, 2014; Mueller et al., 2009; Lesser et al., 2005).

Full TPPPI Feedback Model with Leverage Points

The final TPPPI model identifies points within the system– known as *leverage points*– where intervention can interject to change system behavior (See Figure 17). Leverage points identified in the TPPPI model are based on TPP program best practices (Kirby, 2007) and innovative insights drawn from evaluating system structure and possible insertion points. Acknowledging the cyclical nature of the reinforcing relationships among TPPPI variables, intervention leverage points exist and have the potential to change system behavior when implemented. The five identified leverage points include: Providing Supporting for TPP Organizations, Facilitator Incentive Programs, Advocacy Training for Key Stakeholders and Educational Seminars for Community Members, and Eliciting Youth Voice.

Intervention Leverage Point #1 Providing Supporting for TPP Organizations. One strategy for improving the capacity of the organization that implements TPP programs is providing continuous support and resources. Interventions which provide adequate funding, staff personnel, staff training, and technical assistance for groups and individuals serve to improve the capacity for sustained implementation

practice (Cronin, Heflin, & Price, 2014; Potter et al., 2016; LaChausse, Clark, & Chapple, 2014); Plastino, Quinlan, Todd, & Tevendale, 2017). A key to providing resources for implementing organizations and their partners is consistent communication among developers, managers, facilitators, and staff personnel through well-developed and accessible communication channels (e.g., listserv, WebEx conference calling). At the onset of any TPPP program, strategic planning meetings which develop the theory of change, logic models, program objectives, implementation measurement tools (e.g., fidelity monitoring logs), and evaluation plans are critical for program success.

Intervention Leverage Point #2 Facilitator Incentive Programs. Facilitators are essential to the implementation process and in the absence of these individuals problems can arise. As discussed in an early section, facilitator burnout and turn-over are challenges faced by organizations implementing TPP programs (Gilmore et al., 2015; Asheer, Berger, Meckstroth, Kisker, & Keating, 2014; LaChausse, Clark, & Chapple, 2014). Interventions such as facilitator incentives programs offer an opportunity to recruit and sustain quality facilitators. Rewards such as financial incentives, mileage reimbursement, and support for external professional development and training may incentivize facilitators to remain committed to the TPP program despite challenges along the way. Including facilitator feedback regarding their motives and interests for participating in the programs can also be valuable data points for organizational planners to use in tailoring incentives and rewards.

Intervention Leverage Points #3.1 Advocacy Training for Key Stakeholders and #3.2 Educational Seminars for Community Members. State/district policies which govern teen pregnancy prevention programs can advance or block efforts by organizations, facilitators, or community-based implementation partners. In the presence of restrictive policies, interventions to build advocacy skills and expertise to support and lobby for additional comprehensive sexuality education policies are critical. Organizations and facilitators can participate in training which improves policy-centered messaging and talking points, developing and disseminating press release documents and policy briefs to members of the community, or engaging in local or state-level lobbying activities (Advocates for Youth, 2000). Skill development related to advocacy can improve the implementation environment by garnering more support for sustained, comprehensive programs for adolescents.

Another leverage point within the socio/political environment affecting TPPPI focused on community voice and parental involvement. Due to the sensitive nature of sexuality education and teen pregnancy prevention topics, many organizations are faced with on-going community and parental opposition (CDC, 2007). To decrease the negative effects produced by hesitant or angry community members, an intervention leverage point can involve facilitating town hall meetings and/or educational seminars. Town hall meetings provide community members and parents a safe, structured place to voice concerns while also learning about the TPP program being implemented in their communities (Fawcett et al., 1994)

Intervention Leverage Point #4 Eliciting Youth Voice. The final leverage point in the TPPPI model posits engaging youth as valuable members of the program planning and implementing stages. To improve retention, engagement, and learning in the TPP program youth voice should be considered as a primary stakeholder in the strategic planning stages of the program (The Rhode Island Alliance, 2012). Youth development principles utilized among TPP program Tier I cases (Replication of Teen Outreach Program [TOP] in Louisiana, New York, and Florida) (Crean, Seibold-Simpson, Jambon, & Kreipe, 2015; Daley et al., 2015) noted youth voice and perspective as informative for future program implementation.

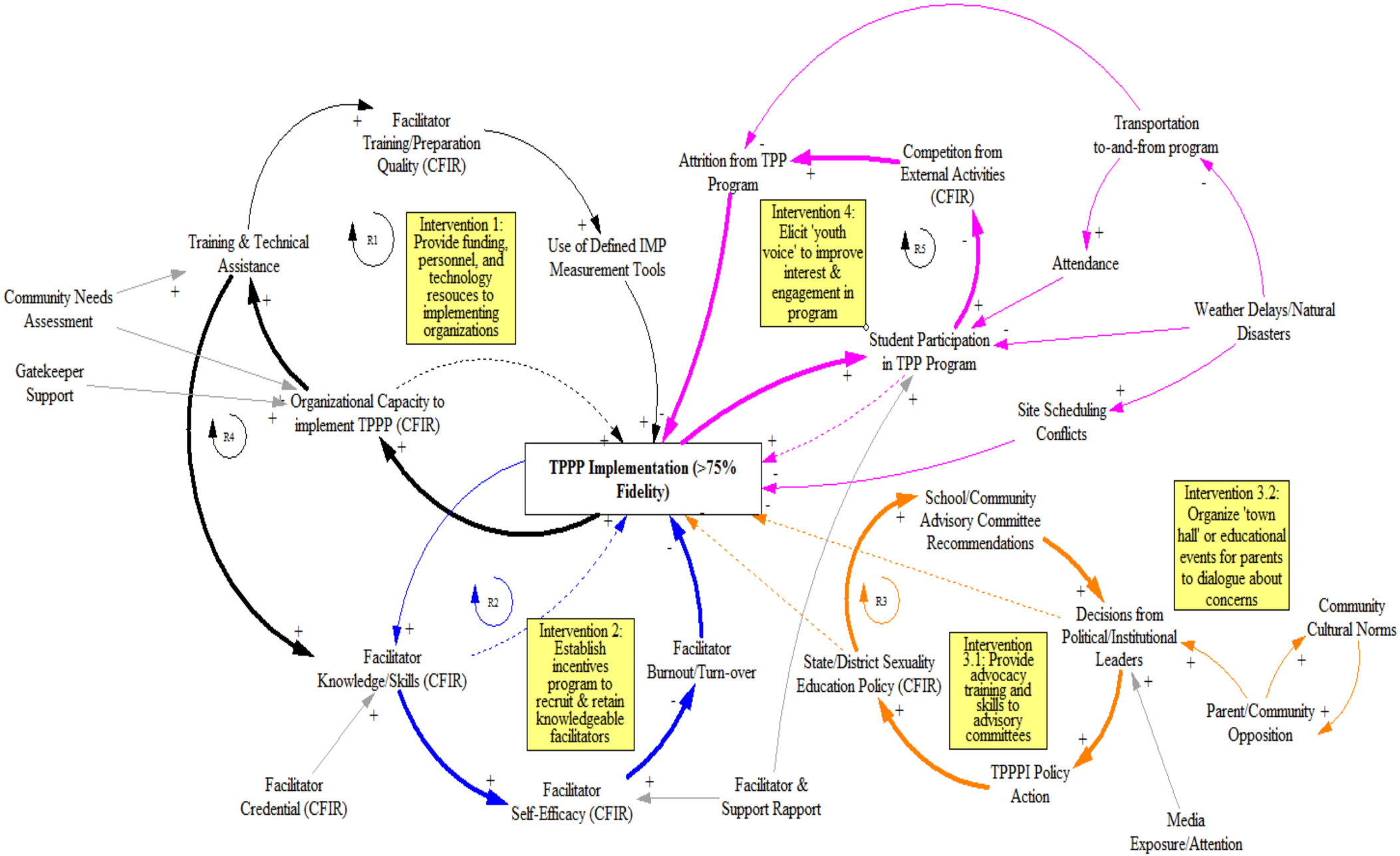

Figure 17. TPPPI Model including Feedback Loops and Intervention Leverage Points

Discussion

This is among the first attempts to apply qualitative systems mapping of feedback mechanisms to understand teen pregnancy prevention program implementation. This qualitative synthesis lays the foundation for future quantitative modeling of TPP program implementation practices. The model describes a theorized causal map of TPPPI integrating peer-review evidence from a scoping review of the literature and empirical results from a cross-case analysis investigating the 2010-2014 OAH Teen Pregnancy Prevention Program Tier I and II programs. The map highlights three conceptual insights for understanding TPPPI: Impacts of dynamic feedback on implementation, influences from the internal implementation setting, and external forces which impact program implementation.

Importance of System Feedback

The first conceptual contribution of this paper was to explicitly identify and deconstruct the dominant reinforcing loops and drivers which impacted teen prevention program implementation according to the data. Reinforcing loops R1-5 theorized causal relationships, which once initiated, produce cyclical behavior which leads to varying amounts of TPPPI. By visually presenting the relationships between variables (e.g., organizational capacity and training & technical assistance) researchers and practitioners can evaluate driving factors which support the dynamic hypothesis behind implementation practice.

Another added value of viewing TPP program implementation practices from a feedback-perspective is the iterative, participatory process involved in constructing and

refining model findings. Hovmand (2013) describes community-based systems dynamics (CBSD) as a meaningful methodology to engaging communities around work in social and health sciences. The framework for identifying the problem, exposing mental models by developing connection circles and graphically organizing a CLD can improve stakeholder's understanding of the problem while also revealing leverage points where intervention effects can be maximized (Hovmand, 2013; Richardson, 2011).

Internal Implementation Setting

The internal implementation setting, comprised of organizational structures and individuals who directly affect TPPPI, is essential for full program implementation. Results from this qualitative system mapping illustrated a reinforcing relationship between the youth-serving organizations, training mechanisms, and facilitators. Reinforcing loops *Organization Characteristics, Facilitator Characteristics, and Organization and Facilitator Training Relationship* contribute feedback-level insights about the decisive behavior of the TPPPI model.

One example supported by the peer-reviewed literature is the use and training of implementation measurement tools to improve implementation (*R1 Organization Characteristics*). Cronin et al. (2014) reported fidelity assessment and outcomes for Making Proud Choices (MPC), an adolescent sexual health program for African-American youth in urban, high HIV communities. Authors described the use of a fidelity scoring system which proved to be an effective mechanism for providing technical assistance in program implementation, and thus improved facilitator's adherence to and adolescents' benefit from MPC (Cronin, Heflin, & Price, 2014). Such evidence supports

the dominant causal connection between organizational capacity and training and technical assistance, which sequentially led to improvements in facilitator training and use of measurement tools, such as a fidelity monitoring logs (Cronin, Heflin, & Price, 2014; Potter et al., 2016; LaChausse, Clark, & Chapple, 2014); Plastino, Quinlan, Todd, & Tevendale, 2017).

Variables directly impacting the internal implementation environment are traditionally easier to control by the implementing organization, facilitators, and community-based partners. In order for organizations to sustain high fidelity to program implementation, maintaining reinforcing relationships between positive variables is encouraged, while intervening at leverage points where potential negative outcomes can surface will assist organizations in maximizing their implementation resources and benefit the adolescents who are participating in the TPP programs.

External Implementation Setting

The external implementation setting, encompassing variables and factors directly out of the organization's control also present interesting insights into system behavior and shape the TPPPI dynamic hypothesis. Variables in the Reinforcing loop *Student Enrollment*, such as competition from other activities, attrition, and attendance issues directly affected levels of TPPPI but were often outside the control of the implementing organization (Robinson, Seibold-Simpson, Crean, & Spruille-White, 2016; Bull, Schmiege, & Devine, 2015; Lesser et al., 2005). Leverage points aimed at engaging youth as active stakeholders in the program planning stages to brainstorm and develop

retention strategies, incentives packages, and/or preferred program pedagogical practices, could serve to mitigate attendance and attrition issues reported in the data.

Findings from this paper complement a recent special edition in The Journal of Adolescent Health [JAH] (Farb, Margolis, Rice, & Jensen, 2014) titled *Implementing Evidence-Based Teen Pregnancy Prevention Programs: Legislation to Practice* which discussed implementation challenges and lessons learned from the perspectives of the 2010 OAH teen pregnancy prevention replication and innovation program grantees. Research cited in JAH's special edition point to why implementation is a critical component to program evaluation, and expresses the diversity and complexity of implementing evidence-based efforts in community contexts (Margolis & Roper, 2014). In 2016 the American Journal of Public Health [AJPH] (Morabia, 2016) published a special edition titled *Building Evidence to Prevent Adolescent Pregnancy* which compiled 41 program evaluations assessing the effectiveness of replicated and innovative TPP programs. Lastly, in the spring of 2017 The Journal of Adolescent Health (Farb, Margolis, Rice, & Jensen, 2017) released a special supplement edition titled, *Implementing Community-Wide teen Pregnancy Prevention Initiatives* which discussed results from a National Demonstration Project - Integrating Services, Programs, and Strategies through Community-Wide Initiatives to decrease rates of adolescent unplanned pregnancy.

The study results presented in the TPPPI provide the first systems-based conceptualization of program implementation aligned with national, federally-funding teen pregnancy prevention evidence from the extant literature. The proposed model can

help school or community stakeholders to better understand the theory of change and factors influencing implementation in their community context and/or provide opportunities to ask broader, system-level questions about primary facilitators to TPP program implementation. Results can be utilized by TPP program organizations to support positive factors improving implementation and mitigate negative environmental barriers to affecting implementation.

Research discussed successes and challenges faced during program implementation and evaluation to expand the knowledge base for adolescent pregnancy prevention research.

Study Limitations and Future Recommendations for Research and Practice

The model building process and outcomes are not without limitations which must be discussed. First, the model is intended to symbolize and visually represent proposed causal variables which facilitate understanding of teen pregnancy prevention implementation, and thus is not an explicit, exhaustive representation of reality. Results cannot be generalized to all implementation environments and practices, but merely serve as a foundation for discussion and future action to enhance TPP program implementation in diverse settings. The TPPPI model was constructed using exiting literature and results from a cross-case study, and these sources do present bias supported by the current implementation literature and data within the field. Triangulation from multiple data sources, in addition to simulation and quantitative modeling, are needed to enhance the reliability of the model.

Next, the broad scope of this study leads us to solely focus on the reinforcing loop relationships among TPPPI. Focusing on the reinforcing mechanisms in the absence of describing any balancing feedback loops may lead to overestimating the power of the reinforcing relationships on endogenous variables in the system. Due to the qualitative nature of this inquiry and absence of quantitative data, no model computational validation or testing took place. However, qualitative system mapping presents the first step to identifying data sources and relationship structures needed for other complexity science methodologies (i.e., simulation model and/or agent-based modeling) (Sterman, 2000). Quantifying the model using data collected from endogenous variables would allow researchers to verify and validate parameter relationships and estimate the strength, direction, and effect of different feedback mechanisms within the model over time (Wittenborn, Rahmandad, Rick, & Hosseinichimeh, 2016; Rykiel, E.J., 1996). Model validation processes proposed by Rykiel (1996) and Sterman (2000) can be applied in future studies to determine if the model is acceptable for its intended use (i.e., the model mimics the real world well enough for its stated purpose) and should be a requirement prior to formal simulation. We used inter-coder audits and collaboration with system dynamics experts to determine conceptual and face validity among factors in the TPPPPI model (Rykiel, 1996).

From the public health practice perspective, SDM can be an effective needs assessment strategy for working with communities who implementing teen pregnancy prevention programs. Unique stakeholder perspectives and experiences can be incorporated during participatory model building sessions (Hovmand, 2013) and help to

improve organization's understanding and capacity to support implementation partners. Moreover, in evaluating the feedback relationships and connections between the internal and external implementation settings organizational decision-makers can better adapt instruction and action to meet the demands placed on the system. Integrating complexity science methods such as SDM with traditional research designs and analytic choices (e.g., Randomized Control Trials) can enhance our understanding of dynamic implementation practices. Simulation results, based on the current proposed structure, could play a significant role in helping organizations determine level of capacity and resources needed to sustain and support implementation efforts.

Conclusions

Implementation is not an event but rather a process, complete with phases or distinct steps, which involve stakeholders, resources, and support systems to mobilize action (Brownson, Kreuter, Arrington, & True, 2006; Fixsen et al., 2005; Metz & Albers, 2014). Implementing teen pregnancy prevention programs is a complex system which incorporates multi-level factors which can positively or negatively influence adolescent sexual health and unplanned pregnancy outcomes. This study is the first of its kind to qualitatively model system factors which influence teen pregnancy prevention implementation practices using literature and results from replicate and innovative TPP program delivered across the United States. Deconstructing and understanding the feedback loops and dominant drivers impacting program implementation help researchers and practitioners deliver high quality programs aimed at keeping adolescents safe and healthy.

CHAPTER V

SUMMARY

The central purpose of this dissertation was to use traditional and systems thinking research approaches to investigate implementation practices among a case sample of teen pregnancy prevention programs. In order to achieve this purpose, three independent articles were written: (1) a scoping literature review documenting the theoretical and applied implementation practices among teen pregnancy prevention programs (Chapter II), (2) a cross-case analysis investigating implementation practices among the 2010-2014 Office of Adolescent Heath Teen Pregnancy Program Tier I Replication and Tier II Demonstration/Innovation program grantees (Chapter III), and (3) qualitative modeling of system dynamics deconstructing factors and feedback relationships which illustrate potential intervention leverage points to improve teen pregnancy prevention program implementation (Chapter IV).

Chapter Findings and Implications for Research and Practice

Chapter II: Scoping Literature Review

The scoping review investigating theoretical and applied implementation practices in the extant literature resulted in three major findings. First, evidence within the field of teen pregnancy prevention (TPP) program implementation currently incorporates theoretical frameworks from disciplines such as Social Work and Community Psychology to explain and enhance practice and outcomes. The Interactive Systems Framework (ISF), Diffusion of Innovation (DOI) Theory, well as the Consolidated Framework for Implementation Research (CFIR) provided guiding

frameworks for organizations and community-based stakeholders who were designing and/or evaluating current TPP program implementation in school, community, and healthcare settings (Walker, Mwaria, Coppola, & Chen, 2014; Rogers, 1995; Damschroder et al., 2009). Identifying and applying such theoretical frameworks to understand TPP program implementation allows researchers and practitioners to evaluate factors and relationships influencing implementation and provides strong justification for sustained focus on implementation science as an interdisciplinary field of study.

The second major finding from the scoping review detailed necessary procedural steps and strategies (i.e., implementation measurement tools, facilitator training) for effectively implementing TPP programs. Cronin, Heflin, & Price (2014) asserted appropriate training and using program fidelity logs facilitated higher quality technical assistance among organization staff, while Romero et al., (2017) echoed evidence to support tailored technical assistance as a mechanism to asses and meet organizational needs. A facilitator training program called *Sex Ed. 101*, created to address unique needs among TPP program implementers in healthcare environments, argued building internal organizational capacity and intrapersonal skillsets among TPP facilitators as procedural steps to improve efficacious implementation (Plastino, Quinlan, Todd, & Tevendale, 2017).

The third major finding derived from the scoping review was a synthesis of empirical evidence regarding implementation results among teen pregnancy prevention programs. Influenced strongly by recent special editions of the Journal of Adolescent Health [JOA] (Farb, Margolis, Rice, & Jensen, 2017) and the American Journal of

Public Health [AJPH] (Morabia, 2016), TPP program implementation results reported high fidelity to program core components and positive interactions among facilitators and participants in several evidence-based TPP interventions (e.g., Teen Outreach Program (TOP) + text message program called Youth All Engaged! in Colorado, Adult Identity Mentoring (Project AIM) in California, Teen Outreach Program (TOP) in Ohio) (Bull et al., 2016; Workman, Flynn, Kension, & Prince, 2015; Asheer, Berger, Meckstroth, Kisker, & Keating, 2014; Farb & Margolis, 2016).

Barriers to implementation (e.g., restrictive school district policies, retention issues, staff turnover) were reported as environmental factors which impeded implementation among TPP programs (Robinson, Seibold, Simpson, Crean, & Spruille, 2016; Asheer, Berger, Meckstroth, Kisker, & Keating, 2014).

The findings from the scoping literature review (Chapter II) addressed gaps in the knowledge base related to theory, procedures, and empirical evidence about TPP program implementation-level outcomes and provided implications for the future. New research can utilize the summary of current teen pregnancy prevention program implementation practices to inform research question develop, design, and data collection strategies best suited to capture the dynamic factors affecting the implementation process across diverse settings and target populations. Moreover, adolescent health and teen pregnancy prevention professionals (i.e., researchers, practitioners, and stakeholders) can apply insights drawn from this scoping review which included, establishing strong community partnerships needed to recruit and sustain participants and allocating pre-implementation planning time to help organizations

determine strategies and resources needed to manage environment obstacles, as actionable measures to improve implementation practices and outcomes (Tevendale et al., 2017a).

Chapter III: Cross-case analysis

The cross-case analysis conducted in Chapter III revealed three major findings about TPP program implementation. First, Consolidated Framework for Implementation Research (CFIR), a systematic assessment tool used to identify the multi-level factors affecting implementation (Powell, Proctor, & Glass, 2014), aligned to all Tier I and Tier II TPP program case reports in this analysis. Data describing all five CFIR Domains (Intervention, Organization, Community, Facilitator, Process) was present in each case report, and thus suggested that the CFIR was an appropriate, comprehensive model for evaluating TPP program implementation (Damschroder et al., 2009). Overall, Tier I program case reports included more data aligned to Domain 2 Organization and Domain 3 Community sub-constructs, whereas, Tier II cases provided significant reflection on the implementation process as captured in CFIR Domain 5 Execute, sub-construct 5.4 (Reflect).

The OAH performance measure results (i.e., Adherence, Quality, and Context) highlighted the second major finding from the cross-case analysis. Tier I and Tier II program case reports described high fidelity to program core components as well as positive participant engagement and interaction with staff members. High rates of fidelity and dosage were attributed to implementing organization's capacity to sustain the TPP program throughout the project period (Martin, Hill, Nye, & Hollman-

Billermeier, 2015; Slater, & Mitschke, 2015) and facilitator training procedures (Herrling, 2015). The environmental context in which TPP programs took place described other TPP programs experience by treatment and/or control youth in school (i.e., health education classes) or communities (i.e., healthcare clinic instruction) during the OAH project period. Moreover, external events such as staff turnover, restrictive policies regulating sexuality education, and competing interests from outside activities presented obstacles program staff and facilitators had to overcome to ensure effective implementation (Calise, Chow, & Dore, 2015; Martin, Hill, Nye, & Hollman-Billermeier, 2015; Abe, Barker, Chan, & Eucogco, 2015; LaChausse, 2015; Carter, Beadnell, & Vankslyke, 2015).

The major finding from the inductive exploratory coding performed in the cross-case analysis, revealed *Theme III: Implementation Methods* and *Theme IV: Lessons Learned during Implementation Process* as salient data groupings which captured the TPP program practitioner perspective. Sub-theme groups including implementation measurements tools and reporting limitations provided concrete examples of data collection and reporting barriers which affected implementation and prompt discussion about solutions to mitigate implementation barriers in future practice (The Policy & Research Group, 2015a). Overlap existed between the theoretical domains of the adapted TPP program implementation CFIR model (i.e., Organization, Community, Facilitator), and the reported OAH performance measures (i.e., Adherence, Quality, Context), however, the exploratory analysis and themes III and IV highlighted practitioner voices

and experiences which contextual program implementation across the Tier I and Tier II case reports.

Implications for research and practice can be described from the cross-case analysis investigating teen pregnancy prevention implementation practices. Theoretical research contributions applying the CFIR to understand teen pregnancy prevention program implementation practices lay the foundation for future qualitative and quantitative investigation of domains and sub-constructs relative to other adolescent health topic areas (e.g., teen dating violence prevention programs). Future studies testing CFIR and other implementation models (Stages of Implementation Completion, Getting to Outcomes) (Saldana, Chamberlain, Wang, & Hendericks, 2012; Rand Health, 2016) can enhance the field's understanding of theory-informed practice and help individuals and communities maximize implementation resources. The OAH performance measures and exploratory code results concluded implementation efforts are context specific and bound to the social interactions between organization staff, facilitators, and adolescents. Adolescent health and teen pregnancy prevention professionals can use quality and context findings from the OAH performance measures and environmental barriers and facilitator training procedures evidence from major themes III and IV to scaffold pre-implementation planning and full implementation with organization and school/community partners and maximize teen pregnancy prevention programs in the future.

Chapter IV: TPPPI System Model

Results from Teen Pregnancy Prevention Program Implementation (TPPPI) qualitative system dynamics model (SDM) provided three key findings about Tier I replication and Tier II innovative implementation practice. First, the systems map deconstructed factors, supported from the literature (Chapter II) and evidence base in teen pregnancy prevention (Chapter III), affecting program implementation and theorized five dominant feedback loops to explain TPP program implementation. The feedback mechanisms, five theorized reinforcing loops (R1-5) (Coyle et al., 2016; Coyle, Potter, Glassman, McDade-Montez, & Unti, 2015; Martin, Hill, Nye, & Hollman-Billmeier, 2015; Carter, Beadnell, & Vanslyke, 2015), provide structure to the TPPPI model and trigger cause-and-effect behaviors within the system (Sterman, 2000; Wittenborn, Rahmandad, Rick, & Hosseinichimeh, 2016). Reinforcing feedbacks loops characterized by small increases in one variable, traced along the whole loop, leading to a further increase in the initial variable, produce *vicious* or *virtuous* cycles that facilitator or block effective TPP program implementation. By visually representing the relationships between variables (e.g., organizational capacity and training & technical assistance) researchers and practitioners can identify dominant factors which support the dynamic hypothesis behind TPP program implementation practice.

Next, the TPPPI model shows an internal and external implementation environment as dominant drivers of implementation behavior. The internal implementation setting comprised of organizational structures and individuals who directly affect TPPPI, is essential for effective and adherence and dosage to program

core components (Cronin, Heflin, & Price, 2014; Potter et al., 2016; LaChausse, Clark, & Chapple, 2014). For instance, the reinforcing loop (R4) *Organization and Facilitator Training Relationships* asserted as organizational capacity to support teen pregnancy prevention programs increases, training opportunities for facilitators also increases which improves capacities among organizations. The theorized causal relationship between these internal implementation setting factors suggest dynamic interactions needed to support effective TPP implementation. The external implementation setting includes factors outside core organizational functionality that still have influence on implementation practices. Factors such as presence of enrolled and engaged students (Philliber, Philliber, & Brown, 2015) and policy regulations surrounding sexuality education (Martin, Hill, Nye, & Hollman-Billmeier, 2015; LaChausse, 2015). For example, external forces theorized in reinforcing loop (R5) *Student Enrollment and Participation* illustrate competition from other activities, attrition, and attendance issues directly affecting TPPPI (Robinson, Seibold-Simpson, Crean, & Spruille-White, 2016; Bull, Schmiege, & Devine, 2015; Lesser et al., 2005). The external implementation setting is often beyond reach of the TPP program implementation staff but can have considerable effects on program dosage and fidelity to core components.

The third major finding from the TPPPI identified leverage points, intersections within the system where interventions are applied to change system behavior (Meadows, 2008; Sterman, 2000). Four leverage points (Improving organizational capacity, Facilitator training procedures, State/district educational policy advocacy, and Engaging

youth voice) provided intervention opportunities within the TPPPI where disruptions or change to system could occur.

Intervention strategies such as engaging youth in program and implementation planning (The Rhode Island Alliance, 2012), offering participant and facilitator incentives packages and tailoring program pedagogical practices (Cronin, Heflin, & Price, 2014; Potter et al., 2016; LaChausse, Clark, & Chapple, 2014; Plastino, Quinlan, Todd, & Tevendale, 2017), can mitigate barriers in the internal and external implementation setting leading to more effective program delivery.

Qualitatively modeling system dynamics among school and community-based health program implementation, provides an example for integrating systems thinking into teen pregnancy prevention research and practice. Using the reinforcing feedback loops and system structure proposed in the TPPPI model, researchers can apply quantitative modeling and simulation to study the dynamic hypotheses and behavior of TPP program implementation-level results over time. Results from TPPPI computer simulation can complement traditional statistical analysis and provide new insights to research study and execution. Implementation researchers and practitioners working within teen pregnancy prevention can use qualitative system dynamics modeling to understand and deconstruct the causal variables which affect program delivery. Topic modeling using Community-based System Dynamics (Hovmand, 2013) techniques can engage practitioners in participatory model building practice and elicit diverse perspectives and insights on *what works* in TPP program implementation in various community settings. Alongside system dynamic modelers, school and community

stakeholders can apply system-thinking perspectives to create and evaluate multi-level TPP program implementation models that capture salient factors and improve the scope of their teen pregnancy prevention program efforts.

In summary, this dissertation, as an integrated body of work, provided: (a) a foundation for understanding the current theoretical, procedural, and empirical evidence describing teen pregnancy prevention program implementation in the peer-review literature; (b) a cross-case analysis investigating theoretical implementation frameworks, applied research performance measures, and exploratory perspectives and themes to describe replicated and innovative teen pregnancy prevention programs in the United States and (c) a preliminary qualitative system dynamics model which identified reinforcing feedback loop mechanisms and theorized causal relationships among factors affecting teen pregnancy prevention program implementation.

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APPENDIX A

Appendix A. Matrix Results for Teen Pregnancy Prevention (TPP) Program Implementation Studies

Theoretical Implementation Evidence (n=3)					
Citation	**Discipline of Origin**	**Theory**	**Relevant Constructs**	**Key Finding(s)**	**Implications for TPP Implementation**
Mueller, T., Tevendale, H. D., Fuller, T. R., House, L. D., Romero, L. M., Brittain, A., & Varanasi, B. (2017). Teen pregnancy prevention: Implementation of a multicomponent, community-wide approach. *Journal of Adolescent Health*, 60(3), S9-S17.	Community Psychology	Interactive Systems Framework for Dissemination and Implementation (ISF)	The ISF is represented by three systems: (1) prevention synthesis and translation system; (2) prevention support system; and the (3) prevention delivery system.	*"To ensure state- and community-based organizations and their partners had capacity to implement the strategies and activities of the initiatives, the national organizations (representing the synthesis and translation system of the ISF) synthesized the research and developed user-friendly tools, resources, and best practice documents. The national organizations also acted in the prevention support system and provided TTA to the state- and community-based organizations for a specific element of the initiative (Table 1). The needs of the state- and community-based organizations were assessed and reviewed annually to inform TTA plans. State- and community-based organizations (also representing the prevention support system in the ISF) then provided TTA to their program and health center partners (the prevention delivery system in the ISF) to implement EBIs and improve clinical practices." (p. S12)*	▪ (1) Prevention synthesis and translation: Use the HHS review of effective programs to aid in TPP program selection process; communities are encouraged to utilize the Promoting Science-based Approaches – Get to Outcomes (PBSA-GTO) and other best practices documents to synthesize implementation research and inform practice. ▪ (2) Prevention support: Annual progress toward project goals and objectives must be reviewed in order to develop and carry-out effective technical assistance supports by state and community-based organizations. ▪ (3) Prevention delivery: The technical assistance plans must be delivered by state and community-based organizations to program and health center partners to implement EBIs and improve TPP clinical practices.
Walker, E. M., Mwaria, M., Coppola, N., & Chen, C. (2014). Improving the replication success of evidence-based interventions: Why a pre-implementation phase matters. *Journal of Adolescent Health*, 54(3), S24-S28.	Communications Studies	Rogers' Diffusion of Innovation	Pre-Implementation Phase & Trialability	*"Generally, the planning year provides an opportunity for adopters to mobilize and consolidate interest and support for implementing an EBI." (p. S25).* *"Implementing an EBI also requires a certain degree of organizational nimbleness, that is, the ability to respond quickly and effectively to unexpected emergent needs." (p. S27).*	▪ Organizational readiness and capacity must be measured and adapted prior to full full-scale rollout of EBI in order to maximize potential during implementation. ▪ Pre-implementation stages are useful for testing dissemination packets and seeking feedback from implementation agency staff and facilitators. ▪ Pre-implementation permits implementers to work through potential implementation barriers arising from differences in cultural norms and intervention settings. ▪ Before selecting an intervention for implementation, organizations must engage in exploration to determine the level of *readiness* of the program and the quality of the educational materials.
Lesesne, C. A., Lewis, K. M., White, C. P., Green, D. C., Duffy, J. L., & Wandersman, A. (2008). Promoting science-based approaches to teen pregnancy prevention: Proactively engaging the three systems of the interactive systems framework. *American Journal of Community Psychology*, 41(3-4), 379-392.	Community Psychology; Public Health	Interactive Systems Framework for Dissemination and Implementation (ISF)	The ISF is represented by three systems: (1) prevention synthesis and translation system; (2) prevention support system; and the (3) prevention delivery system.	*"In an effort to encourage broader use of available science-based programs and approaches, CDC initiated the PSBA project in 2005 (DHHS 2005). PSBA is a five-year project that builds on earlier successes and challenges in* *the field by applying the ISF (Wandersman et al. 2008) to conceptualize and guide the promotion of science-based approaches in the field of teen pregnancy prevention." (p. 380).* *"[ISF] has also contributed to mid-course corrections in terms of training, support, and deciding where to place scarce resources in order to strengthen the linkages between systems." (p. 390)*	▪ Assess the state of prevention practice and the frequency of use of science-based programs for teen pregnancy prevention in local community prior to implementing new efforts (Prevention Delivery System) ▪ Provide on-going support prevention practitioners in effective ways by measuring and reporting effective TA and capacity building strategies ▪ Evaluation and exploratory research is needed to synthesizing current implementation research for teen pregnancy prevention professionals (Support System) (Delivery System) ▪ Better understand the extent of TA required for different steps throughout the project which can take research into practice
Evidence of Implementation Procedures and Practices (n=4)					
Citation	**Purpose**	**Procedural Step**	**Key Finding(s)**	**Implications for TPP Implementation**	
Plastino, K., Quinlan, J., Todd, J., & Tevendale, H. D. (2017).	To understand how UTTH staff educated community	Staff/Facilitator Training	*"UTTH trained 54 probation and residential treatment officers in the*	▪ Implementation agencies should work with school and/or community groups to help identify and select facilitators who have a vested interest in adolescent health and sexuality education.	

Stakeholder education and community mobilization garner support for sex education. *Journal of Adolescent Health*, 60(3), S24-S29.	stakeholders and mobilized community members to support implementation of evidence-based TPP interventions.		*evidence-based curriculum Reducing the Risk, which is provided to teens in detention and/or on probation. UTTH also trained over 300 JPD staff utilizing a training created by the UTTH staff called "Sex Ed. 101." (p. S26-27).* *"Each school selected their facilitators based on interest in TPP and subject matter expertise (e.g., health teachers). Meetings with the champion, principal, and lead teachers at each campus led to an implementation plan and a 2-day facilitator training." (p. S27).*	▪ Appropriate training and technical assistance surrounding EBIs content, activities, and adaptations are needed for facilitator and program staff prior to implementation.
Romero, L. M., Olaiya, O., Hallum-Montes, R., Varanasi, B., Mueller, T., House, L. D., ... & Middleton, D. (2017). Efforts to increase implementation of evidence-based clinical practices to improve adolescent-friendly reproductive health services. *Journal of Adolescent Health*, *60*(3), S30-S37.	Describe changes, barriers and/or facilitators, and technical assistance provided for implementation evidence-based clinical practices among health center partners as part of a multicomponent, community-wide teen pregnancy prevention initiative.	Tailored Technical Assistance	**"***These findings reflect how the needs assessment was used to identify focus areas for improvement, including tailoring technical assistance and training efforts and activities to meet health centers' needs" (p. S36).*	▪ Focus groups and semi-structured interviews with organizational staff and facilitators prior to implementation aids in assessing current levels of needs and resources of implementing agency. ▪ Recruit and interview diverse representation from clinical and non-clinical staff to provide more comprehensive assessment of need and to explore barriers and/or facilitators to EBI implementation.
Tevendale, H. D., Condron, D. S., Garraza, L. G., House, L. D., Romero, L. M., Brooks, M. A., & Walrath, C. (2017a). Practical approaches to evaluating progress and outcomes in community-wide teen pregnancy prevention initiatives. *Journal of Adolescent Health*, 60(3), S63-S68.	Provide an overview of implementation performance measures used as part of the community-wide teen pregnancy prevention initiative and describe outcome evaluation results.	Implementation Performance Measures	"Performance measures captured (1) the overall reach of grantee efforts and (2) the quality of implementation of programs and services provided by grantee partners." (p. S64)	▪ Collecting performance measures for implementation must balance between available resources and data and time and resources constrictions within the organization. ▪ Clear needs assessment strategies must be conducted prior to program implementation to determine organization's needs and wants. ▪ Performance measures should be reported annually, semi-annually, or quarterly based on the capacity of the organization to collect data.
Cronin, J., Heflin, C., & Price, A. (2014). Teaching teens about sex: A fidelity assessment model for making proud choices. *Evaluation and Program Planning*, 46, 94-102.	Describe a three-component fidelity tool created to measure implementation of the Making Proud Choices (MPC), demonstrating how fidelity information can be used to inform facilitator training and technical assistance.	Fidelity Monitoring Tools	*"In order to monitor fidelity of program delivery, program facilitators were required to submit fidelity logs through an online system within 48 h of completing each of the 8 curriculum modules. Fidelity logs were created by the evaluation team based on the Making Proud Choices: Adaptation Kit." (p. 96).*	▪ Increased necessity for local program administrators to operate evidence-based programs developed for different target populations and community settings calls for systematic measurement tools to capture facilitator compliance with program implementation. ▪ The fidelity log including a three-component fidelity score (i.e., program delivery, class attendance, program implementation) can measure information reported by the facilitator at the conclusion of each module. ▪ The three-component fidelity measurement system can be effective way to target technical assistance at the class, program, or organizational level during pre-, ongoing, and post-implementation. ▪ Organizations without pre-existing networks and access to teens should use a pilot year to develop crucial relationships in the community. ▪ Target technical assistance to facilitators struggling with program activities (e.g., condom demos) to encourage higher levels of fidelity. ▪ Use program fidelity scoring tool to understand trends occurring across implementation sites. ▪ Link program fidelity scores with state educational benchmarks to create more stakeholder buy-in.

Empirical Implementation Evidence (n=16)

Citation	TPP Intervention; Program Setting	Program Theory	Implementation Measures	Key Finding(s)	Barriers to Implementation	Recommendations for Future Implementation
Bull, S., Devine, S., Schmiege, S. J., Pickard, L., Campbell, J., & Shlay, J. C. (2016). Text messaging, teen outreach program, and sexual health behavior: A cluster randomized trial. *American Journal of Public Health*, 106(S1), S117-S124.	Teen Outreach Program (TOP) + text message program called Youth All Engaged! (YAE!) Community	Integrated Theory of mHealth	▪ Session fidelity logs ▪ TOP Session attendance records ▪ Text-message delivery tracking	*"TOP/YAE! participants attended a mean of 10.9 +/- 8.8 sessions, with a mean of 10.8 +/- 13.9 community service learning hours, and TOP alone participants attended a mean of 13.0 +/- 8.9 sessions and 12.5 +/- 12.9" (p.5).* *"Participants in TOP/YAE! received 75 text messages, of which 40% were bidirectional. A detailed analysis of 2 years of text message delivery documented that 80% of participants responded to at least 1 bidirectional text message, and responded an average of 13 times to bidirectional messages. Participants aged 16 years and*	▪ Lack of participant attendance at sessions ▪ Lack of interest in TOP ▪ Competing commitments for other club and after-school activities	▪ Integrating of text messaging (particularly bi-directional texting) with TOP core curriculum may improve impact. ▪ Consider whether and how technology can deliver content to supplement face-to-face sessions when issues of length, staffing, or cost are present.

				older, female adolescents, and Hispanic participants responded significantly more frequently to bidirectional messages." (p. 6).		
Kelsey, M., Blocklin, M., Layzer, J., Price, C., Juras, R., & Freiman, L. (2016a). Replicating reducing the risk: 12-nonth impacts of a cluster randomized controlled trial. *American Journal of Public Health*, 106(S1), S45-S52.	Reducing the Risk School	Not discussed.	▪ Session Fidelity Logs ▪ Facilitator (i.e., Teacher) Observations ▪ Site Visits	*"Reducing the Risk was well implemented across the 3 replication sites. Grantees hired health educators with appropriate background experience and skills to deliver the program; all received training approved by the program developer, and the program was delivered with fidelity (adherence to its core elements and without modifications that threatened those core elements). Attendance varied by replication site: In San Diego, 85% of students attended at least 75% of the sessions, compared with 73% of students in St. Louis and 47% of students in Austin." (p. S49).*	Not discussed.	Not discussed.
Calise, T. V., Chow, W., Doré, K. F., O'Brien, M. J., Heitz, E. R., & Millock, R. R. (2016). Healthy futures program and adolescent sexual behaviors in 3 Massachusetts cities: A randomized controlled trial. *American Journal of Public Health*, 106(S1), S103-S109.	Nu-CULTURE School	Social Cognitive Theory (SCT); Social Ecological Theory	▪ Attendance Logs ▪ Fidelity Checklists ▪ Yearly health educator rosters detailing characteristics and training attendance	*"Nu-CULTURE was delivered each year (September 2011 to June 2014) during regularly scheduled classes in all treatment schools. Eighty-eight percent of activities were delivered as prescribed and with high fidelity." (p. S106).*	▪ Weather-related school closures ▪ Conflicts with academic achievement test schedule ▪ Students opting out of the program.	Not discussed.
Gelfond, J., Dierschke, N., Lowe, D., & Plastino, K. (2016). Preventing pregnancy in high school students: Observations from a 3-year longitudinal, quasi-experimental study. *American Journal of Public Health*, 106(S1), S97-S102.	Need to Know (N2K) School	Theory of Planned Behavior/Reasoned Action (TPB/RA)	▪ Session Fidelity Logs ▪ Facilitator (i.e., Teacher) Observations	*"Despite the lack of impact on study outcomes, program fidelity was robust and documented via health educators' fidelity logs for each session implemented. An independent observer also completed fidelity logs and conducted observations for 5% of all sessions implemented. The average facilitator-reported fidelity over the 3 years was 98%, which was consistent with the independently observed fidelity of 98%. The observer made recommendations for improved program fidelity when observation scores were low (< 3 on a 5-point scale). The percentage of observed sessions that received high scores (4 or 5 on a 5-point scale) ranged from 92% to 100% across the 3-year program". (p. S98).*	Not discussed.	▪ Try to eliminate gaps between actual implementation content (e.g., abstinence) and measurement tools used to assess program effectiveness and implementation practice (e.g., pregnancy rates).
Potter, S. C., Coyle, K. K., Glassman, J. R., Kershner, S., & Prince, M. S. (2016). It's your game… Keep it real in south carolina: A group randomized trial evaluating the replication of an evidence-based adolescent pregnancy and sexually transmitted infection prevention program. *American Journal of Public Health*, 106(S1), S60-S69.	It's Your Game: Keep It Real (IYG) School	Social Cognitive Theory (SCT); Social Influence Models; & Theory of Triadic Influence	▪ Session Fidelity Logs ▪ Facilitator (i.e., Teacher) Observations ▪ On-site visits and technical assistance	*"Fidelity and quality of implementation by IYG facilitators was high, as was students' exposure to the curriculum. Facilitators reported delivering all 12 lessons to every class in both the seventh and eighth grade years. An average of 98% of IYG activities were implemented for an average of 624 minutes of programming in seventh grade and 600 minutes in eighth grade. On a scale ranging from 1 = poor to 5= excellent, observers rated overall quality of implementation as a 4.5 for seventh grade lessons and as a 4.4 for eighth grade lessons. Students attended an average of 11.4 sessions of 12 in seventh grade and 10.1 sessions of 12 in eighth grade; 11% did not receive eighth grade IYG because of school transfers". (p. S62).*	▪ Effectiveness of classroom teacher versus implementation by a controlled research environment in an efficacy trial	▪ Exposure youth to program content as early as possible in order to maximize dosage and effectiveness.
Robinson, W. T., Seibold-Simpson, S. M., Crean, H. F., & Spruille-White, B. (2016). Randomized trials of the teen outreach program in Louisiana and Rochester, New York. *American Journal of Public Health*, 106(S1), S39-S44.	Teen Outreach Program (TOP) Community	Not discussed.	▪ Facilitator (i.e., Teacher) Observations ▪ Facilitator self-report Surveys ▪ Quality and satisfaction measures on post-intervention survey	*"Youths were offered a minimum of 25 weekly sessions, with an average of 27.6 sessions. Furthermore, the Changing Scenes curriculum was provided with high quality. Independent evaluation staff who were trained in the Changing Scenes curriculum rated the facilitators as either 4 or 5 (scale of 1–5, with 5 being most positive) an average of 90% of the time on a number of constructs important to TOP session quality (including participants understanding the material and active participation, as well as facilitator's clarity, knowledge, rapport, enthusiasm and ability to demonstrate a "values neutral" approach." (p. S41-42)*	▪ Lack of participant attendance at sessions ▪ Limited transportation necessary to bring participants to the sessions ▪ Competing interests of the youths (e.g., sports, after-school tutoring) ▪ Parents restricting TOP attendance as a mechanism of discipline (e.g.,	▪ Sufficient buy-in from institutional gatekeepers and parents is needed for successful implementation. ▪ Consider scheduling and obtaining space for community-based interventions versus convenience of implementation in traditional, school-based settings.

						youths were grounded because of poor grades) ▪ Other adults restricted youths from attending (in Rochester, youths were expelled from recreation centers for disciplinary reasons)	
Kelsey, M., Layzer, C., Layzer, J., Price, C., Juras, R., Blocklin, M., & Mendez, J. (2016b). Replicating ¡Cuídate!: 6-month impact findings of a randomized controlled trial. *American Journal of Public Health*, 106(S1), S70-S77.	¡Cuidate! School	Not discussed.	▪ Session Fidelity Logs ▪ Facilitator (i.e., Teacher) Observations	*"¡Cuídate! was well implemented across all 3 replication sites. The 3 grantees hired staff with appropriate background experience and skills to deliver the program; all received training provided by the curriculum. Each of the grantees successfully delivered the program with fidelity (adherence to its core elements and without modifications that threatened those core elements). At all 3 replication sites, a majority of students received at least 75% of the sessions offered." (p. S73).*	Not discussed.	Not discussed.
Abe, Y., Barker, L. T., Chan, V., & Eucogco, J. (2016). Culturally responsive adolescent pregnancy and sexually transmitted infection prevention program for middle school students in Hawaii. *American Journal of Public Health, 106*(S1), S110-S116.	Pono Choices School	Theory of Change	▪ Session Fidelity Logs ▪ Facilitator (i.e., Teacher) Observations ▪ Facilitator interviews	*"The implementation data indicate that Pono Choices was delivered with high adherence to the intended intervention model." (p. S112).* *"Teachers completed 98% of planned activities across all 3 semesters. From attendance records, we estimated that 94% of students completed at least 75% of the curriculum. The classroom observation data that our evaluation team members collected also suggest that the quality of the activities completed was high: The average observer ratings for quality of delivery and student engagement were 4.3 and 4.6, respectively, on a scale ranging from 1 to 5, with 5 being excellent." (p. S113).*	▪ High attrition rates	Not discussed.
Gilmore, K., Hoopes, A. J., Cady, J., Oelschlager, A. M. A., Prager, S., & Vander Stoep, A. (2015). Providing long-acting reversible contraception services in Seattle school-based health centers: Key themes for facilitating implementation. *Journal of Adolescent Health*, 56(6), 658-665.	Take Charge! Program (a Washington State Medicaid program that provides reproductive health services for low-income women and minors unwilling to use parental health insurance because of confidentiality concerns); School (On-site Health Clinic)	Not discussed.	▪ Key Informant Interviews	*"…most cited barriers across key informant groups were as follows: perceived lack of provider procedural skills and bias and negative attitudes about LARC methods. The most common facilitators identified across groups were as follows: clear communication strategies, contraceptive counseling practice changes, provider trainings, and stakeholder engagement. Two additional barriers emerged: Technical and logistical barriers to LARC service delivery and expense and billing were cited by SBHC administrative staff, community partners, and public health administrative staff." (p. S68)*	▪ Clinician skill, confidence, and training ▪ Bias and negative attitudes about LARC methods ▪ Low demand for LARC devices and patient no-shows made it difficult to schedule LARC insertions ▪ Expense and billing barriers	▪ Clear communication about the risks and benefits of LARC methods using up-to-date evidence and communication catered to the needs and concerns of the audience (clinicians, parents, school officials, teens). ▪ Use tiered contraceptive counseling among SBHC clinicians and staff. ▪ Engage stakeholders before LARC service delivery, starting with the SBHC providers. ▪ Provide hands-on training and shadowing opportunities with an NP experienced in LARC insertion. ▪ Present evidence regarding LARC safety and efficacy to SBHC clinicians by a trusted physician in the community. ▪ Use the medically-accurate training materials (e.g., Contraceptive Choice Project findings, ACOG committee opinions, or CDC 2010 Medical Eligibility Criteria for Contraceptive Use).
Workman, L. M., Flynn, S., Kenison, K., & Prince, M. (2015). Adoption of an evidence-based teen pregnancy prevention curriculum: a case study in a South Carolina school district. *American Journal of Sexuality Education*, 10(1), 70-85.	It's Your Game: Keep It Real (IYG) School	Not discussed.	▪ Key Informant Interviews	*"Six key themes related to program adoption emerged from the analysis: (a) developing networks among community TPP advocates, (b) partnering with local media to raise awareness about TPP issues and keep the community informed, (c) establishing a commitment within school districts to address TPP, (d) assembling a diverse committee of stakeholders who are committed to implementing TPP programming in schools, (e) developing a comprehensive approval process that involves multiple perspectives, and (f) utilizing the expertise of TPP organizations" (p. 6).*	▪ Scheduling barriers	▪ Discuss the importance of community organizing and engaging local media in the curriculum adoption process.

Asheer, S., Berger, A., Meckstroth, A., Kisker, E., & Keating, B. (2014). Engaging pregnant and parenting teens: Early challenges and lessons learned from the evaluation of adolescent pregnancy prevention approaches. *Journal of Adolescent Health*, 54(3), S84-S91.	Adult Identity Mentoring (Project AIM) & Teen Outreach Program (TOP) Community	Behavior Model of Health Services Use; Theory of Possible Selves	▪ Session Fidelity Logs ▪ Facilitator (i.e., Teacher) Observations ▪ On-site one-on-one and/or small group meetings ▪ Conference calls ▪ In-person or electronic technical assistance	*"The analysis identified four main themes or lessons. These lessons center on (1) recruitment and retention; (2) staff capacity; (3) barriers to participation; and (4) participants' overarching service needs." (p. S87)*	▪ Lack of participant attendance at sessions ▪ Inconsistent communication with participants due to unstable living conditions and competing interests and priorities ▪ Limited transportation necessary to bring participants to the sessions ▪ Staff/facilitators feeling uncomfortable with TPP program content ▪ Funding cuts or restrictions	▪ Establish formal referral partnerships for recruiting and retaining participants. Once partners are invested, staff hurdles and obstacles are more easily overcome.
Demby, H., Gregory, A., Broussard, M., Dickherber, J., Atkins, S., & Jenner, L. W. (2014). Implementation lessons: The importance of assessing organizational "fit" and external factors when implementing evidence-based teen pregnancy prevention programs. *Journal of Adolescent Health*, 54(3), S37-S44.	Becoming a Responsible Teen (BART) School	Not discussed.	▪ On-site one-on-one and/or small group meetings ▪ Conference calls ▪ Standardized implementation assessment process	*"Organizational component barriers. Despite their enthusiasm, it became evident during the planning and pilot year that the CBOs did not have the administrative capacity to meet 4Real Health's structured implementation requirements. One limitation was their lack of adequate facilities. For proposed after-school implementations, 4Real Health had to compete with other after-school activities, and participants were less likely to attend all eight sessions. Transportation home from the afterschool sessions was also a barrier, especially in a community with limited public transportation. Without the needed organizational capacity, it was impossible for these CBOs to implement 4Real Health; therefore, LPHI discontinued these partnerships during the planning and pilot year." (p. S40)*	▪ Limited transportation necessary to bring participants to the sessions ▪ Lack of administrative capacity to hire and supervise program staff ▪ Inconsistent access to facilities/classroom space to implement program ▪ Unable to recruit target number of participants to enroll	▪ Before implementing an EBP, it is essential to assess potential barriers and facilitators that exist at each implementation level (core implementation components, organizational components, and external factors) and examine how these factors could enable or hinder implementation. ▪ After assessing the needs and characteristics of the population being served and identifying an appropriate EBP, planners should fully research and understand the core intervention and implementation components that must be in place to meet fidelity requirements. ▪ Ensure all potential partners fully understand what is expected of them prior to implementation. Developing a clear and concise checklist is a useful way to help clarify these requirements. ▪ Lead organizations should have frequent and open communications with implementation partners about program requirements and capacity needs. ▪ Conduct multiple site visits prior to implementation to help to ensure sites are adhering to requirements and serve as a good way to identify and address barriers as they arise. ▪ The key partner organization characteristics needed for implementation are (1) strong administrative motivation and support to implement TPP programming; (2) ability to reach and recruit large numbers of the target population; (3) established programming in which you can integrate your TPP program; (4) incentives to help motivate youth participation in the program; (5) logistical capacity to implement (classrooms, chairs/tables, program time, etc.); and (6) administrative capacity to implement (staffing, office space, oversight, etc.).
LaChausse, R. G., Clark, K. R., & Chapple, S. (2014). Beyond teacher training: The critical role of professional development in maintaining curriculum fidelity. *Journal of Adolescent Health*, 54(3), S53-S58.	Positive Prevention PLUS Sexual Health Education School	Social Learning Theory & Cognitive Behavior Theories	▪ Session Fidelity Logs ▪ Facilitator (i.e., Teacher) ▪ Observations ▪ Facilitator self-report Surveys	*"Compared with non-health credentialed teachers, credential health education teachers had greater comfort and self-efficacy regarding sex-related instruction. Teacher self-efficacy and comfort were significant predictors of adherence" (p. D53).*	▪ Staff/facilitators feeling uncomfortable with TPP program content ▪ Facilitators undertrained to implement TPP program	▪ Sequence teacher training opportunities, beginning with a 2-day training session, then add an online teacher training component, and follow-up skill-building session. ▪ Technical assistance to improve teacher comfort and self-efficacy can lead to improved implementation fidelity.

Sharpio, R., & Kisker, E. (2012). Making a plan and sticking to it: Implementing an enhanced version of HealthTeacher in Chicago. *Mathematica Policy Research*, 1-38. Retrieved from: https://www.mathematica-mpr.com/our-publications-and-findings/publications/making-a-plan-and-sticking-to-it-implementing-an-enhanced-version-of-healthteacher-in-chicago	Family Life and Sexuality Module of the *HealthTeacher* middle school curriculum School	Theory of Change	▪ Sessions Fidelity Logs ▪ Site visits and telephone interviews ▪ Facilitator (i.e., Teacher) Observation Forms ▪ Facilitator self-report Surveys	"*The implementation evaluation shows that a large urban school district can consistently implement an online sex education curriculum, with some inevitable lapses or deficiencies. District staff provided training that teachers found useful, teachers completed the curriculum with their students, and students engaged in learning the material." (p. 17).*	▪ Time constraints in finishing program content ▪ Context and background information absent from lessons ▪ Unclear directions and instructions ▪ Lack of technology resources for implementation ▪ Financial subscription to *HealthTeacher*	▪ Program schedule must allow time for student question/answer. ▪ Deliver lesson content 1+ time per week to enhance continuity. ▪ Determine a balance between strict program fidelity (e.g., core components) and opportunities for teacher autonomy and creativity. ▪ Staff overseeing implementation in schools must provide additional support to new teachers, who are likely unfamiliar/uncomfortable with program content.
Mueller, T. E., Castaneda, C. A., Sainer, S., Martinez, D., Herbst, J. H., Wilkes, A. L., & Villarruel, A. M. (2009). The implementation of a culturally based HIV sexual risk reduction program for latino youth in a denver area high school. *AIDS Education & Prevention*, *21*(Suppl. B), 164-170.	¡CuÃdate! School	Not discussed.	▪ In-person or electronic technical assistance	*"¡Cuídate! was adapted to accommodate the typical class period by delivering program content over a larger number of sessions and extending the total amount of time of the program to allow for additional activities. Major challenges of program implementation included student recruitment and the "opt in" policy for participation. Despite these challenges, ¡Cuídate! was implemented with minor adaptations in a school setting." (p. 164)*	▪ Recruiting students for participation despite feelings of embarrassment, fear, of judgement from peers ▪ Lack of student engagement in program because youth felt they 'already knew' sexuality content ▪ Program permission slip signature and return prior to implementation	▪ Use an opt-in/out method for enrollment process. ▪ Encourage greater parental involvement and host informational sessions. ▪ Assess student's knowledge before the program and build in time before the program for students to ask basic questions about pregnancy and anatomy/physiology.
Lesser, J., Verdugo, R. L., Koniak–Griffin, D., Tello, J., Kappos, B., & Cumberland, W. G. (2005). Respecting and protecting our relationships: A community research HIV prevention program for teen fathers and mothers. *AIDS Education & Prevention*, 17(4), 347-360.	Adapted: "Be Proud! Be Responsible" & "Respeto/Proteger" Community	Theory of Planned Behavior/ Reasoned Action (TPB/RA) & Social Cognitive Theory (SCT)	▪ On-site one-on-one or small group meetings ▪ Conference calls ▪ Interviews	*"This community–academic collaborative research project was successful only because of the strength of the relationships developed between the project partners and between the project partners and the program participants that included both confianza y respeto mutuo, trust and mutual respect." (p. 357).*	▪ Lack of participant attendance at sessions ▪ Lack of transportation necessary to bring participants to-and-from program sessions ▪ Competition by external activities	▪ The strength of relationships between the community organization and academic partners, based on trust and mutual respected, is critical to program success. ▪ Community involvement enhances the likelihood that intervention activities will be socially and contextually appropriate.

APPENDIX B

Appendix B. The comprehensive list of TPP program models which met the review criteria for evidence of effectiveness.

OAH 37 Evidence-Based Interventions Effective at Reducing Teen Pregnancy and Sexual Risk Behaviors[1]	
▪ *¡Cuidate!* ▪ *Aban Aya Youth Project* ▪ *Adult Identity Mentoring (Project AIM)* ▪ *All4You!* ▪ *Assisting in Rehabilitating Kids (ARK)* ▪ *Be Proud! Be Responsible!* ▪ *Be Proud! Be Responsible! Be Protective!* ▪ *Becoming a Responsible Teen (BART)* ▪ *Children's Aid Society (CAS)-Carrera Program* ▪ *Draw the Line/Respect the Line* ▪ *Families Talking Together (FTT)* ▪ *FOCUS* ▪ *Get Real* ▪ *Health Improvement Project for Teens (HIP Teens)* ▪ *Heritage Keepers Abstinence* ▪ *HORIZONS* ▪ *It's Your Game: Keep It Real (IYG)* ▪ *Making a Difference!* ▪ *Making Proud Choices!* ▪ *Prime Time*	▪ *Project IMAGE* ▪ *Project TALC* ▪ *Promoting Health Among Teens! Abstinence-Only Intervention* ▪ *Promoting Health Among Teens! Comprehensive Abstinence and Safer Sex Intervention* ▪ *Raising Healthy Children (formerly known as the Seattle Social Development Project)* ▪ *Reducing the Risk* ▪ *Respeto/Proteger* ▪ *Rikers Health Advocacy Program (RHAP)* ▪ *Safer Choices* ▪ *Safer Sex* ▪ *Sexual Health and Adolescent Risk Prevention (SHARP) (formerly known as HIV Risk Reduction Among Detained Adolescents)* ▪ *SiHLE* ▪ *Sisters Saving Sisters* ▪ *STRIVE* ▪ *Teen Health Project* ▪ *Teen Outreach Program (TOP)* ▪ *Seventeen Days*

[1]Department of Health & Human Services & Office of Adolescent Health (2015). *Teen Pregnancy Prevention Evidence Review*. Retrieved from http://tppevidencereview.aspe.hhs.gov/EvidencePrograms.aspx

APPENDIX C

Appendix C. Texas A&M University IRB Communication with Principle Investigator regarding application status for proposed research study.

Leigh Szucs

From: Higgins, Catherine <clhiggins@tamu.edu>
Sent: Thursday, March 10, 2016 10:59 AM
To: Leigh Szucs
Cc: alovings@tamu.edu
Subject: RE: IRB Exemption Question

Leigh,

As long as the reports are publicly available and de-identified without a requirement for data use agreement or an application to access the data, then no IRB application is needed. This is true if you are using only one or two public use data set. If you are using three or more types of data sets, then an IRB submission is needed. Please send the final link to the data set when available so that we can add it to the list of public use data sets. Let me know if more information is needed.

Best regards,
Cathy

Catherine L. Higgins, Ph.D., CIP, CIM
Director, Human Research Protection Program | Division of Research | Texas A&M University
750 Agronomy Road, Suite 2701, 1186 TAMU, College Station, Texas 77843-1186
Office: 979-458-4117 | Cell: 832-684-6462 | Fax: 979-862-3176 | clhiggins@tamu.edu | http://rcb.tamu.edu

-----Original Message-----
From: Leigh Szucs [mailto:leigh.szucs@hlkn.tamu.edu]
Sent: Monday, March 7, 2016 7:00 PM
To: Lovings, Aline A. <avilleminey@tamu.edu>; Higgins, Catherine <clhiggins@tamu.edu>
Subject: Re: IRB Exemption Question

Aline,

Thank you so much for the quick response and clarification on my request.

Dr. Higgins,
As follow-up, thank you for considering my question regarding IRB application procedures for a secondary content documentation analysis using grantee evaluation reports. The OAH project officer has confirmed the report release date, late spring 2016, and I am in contact with her now to get a blank template of the reports, as to know more about what their contents will be. In general, the reports will have information pertaining to adolescent/teen pregnancy prevention program (A/TPP) successes, challenges, technical assistance issues, staffing, etc. Findings of organizational structure and capacity will be reported instead of PPI of adolescent participants in the A/TPP themselves.

I am happy to answer any additional questions or provide information if needed to determine if these reports can be added to the public use dataset list.

Thank you both for providing information and I look forward to talking with you in the near future!
Leigh Szucs

Leigh Szucs, M.Ed., CHES

APPENDIX D

Appendix D. The Office of Adolescent Health (OAH) TPP Grantee Final Evaluation Reporting Template

Findings from the Replication of an Evidence-Based Teen Pregnancy Prevention Program

Evaluation of
[Intervention Name] in
[Place]

Final Impact Report for

[Grantee Organization]
[Date]

Prepared by

[Evaluator Organization Authors]

[Recommended Citation]

Acknowledgements:

[In this space, please list contributors to this evaluation report including reviewers and editors that you would like to acknowledge; feel free to acknowledge any persons critical in making the evaluation possible, the program implementation possible, etc.]

This publication was prepared under Grant Number [Insert Grant Number] from the Office of Adolescent Health, U. S. Department of Health & Human Services (HHS). The views expressed in this report are those of the authors and do not necessarily represent the policies of HHS or the Office of Adolescent Health.

Evaluation Abstract: [Evaluation Name goes here]

Grantee
[Copy and paste text/Start writing here.]
Evaluator
[Copy and paste text/Start writing here.]
Intervention Name
[Copy and paste text/Start writing here.]
Intervention Description
[Copy and paste text/Start writing here.]
Counterfactual
[Copy and paste text/Start writing here.]
Counterfactual Description
[Copy and paste text/Start writing here.]
Primary Research Question(s)
[Copy and paste text/Start writing here.]
Sample
[Copy and paste text/Start writing here.]
Setting
[Copy and paste text/Start writing here.]
Research Design
[Copy and paste text/Start writing here.]
Method
[Copy and paste text/Start writing here.]
Impact Findings
[Copy and paste text/Start writing here.]
Implementation Findings
[Copy and paste text/Start writing here.]
Schedule/Timeline
[Copy and paste text/Start writing here.]

Evaluation of [intervention name] in [place]: findings from the replication of an evidence-based teen pregnancy prevention program

I. Introduction
[Copy and paste text/Start writing here.]
A. Introduction and study overview
[Copy and paste text/Start writing here.]
B. Primary research question(s)
[Copy and paste text/Start writing here.]
C. Secondary research question(s)
[Copy and paste text/Start writing here.]

II. Program and comparison programming
[Copy and paste text/Start writing here.]
A. Description of program as intended
[Copy and paste text/Start writing here.]
B. Description of counterfactual condition
[Copy and paste text/Start writing here.]

III. Study design
[Copy and paste text/Start writing here.]
A. Sample recruitment
[Copy and paste text/Start writing here.]
B. Study design
[Copy and paste text/Start writing here.]
C. Data collection
[Copy and paste text/Start writing here.]
1. Impact evaluation
[Copy and paste text/Start writing here.]
2. Implementation evaluation
[Copy and paste text/Start writing here.]
D. Outcomes for impact analyses
[Copy and paste text/Start writing here.]
[Copy and paste Tables III.1 and III.2 here.]
E. Study sample
[Copy and paste text/Start writing here.]
F. Baseline equivalence
[Copy and paste text/Start writing here.]
[Copy and paste Table III.3 here.]
G. Methods
[Copy and paste text/Start writing here.]
1. Impact evaluation
[Copy and paste text/Start writing here.]

2. Implementation evaluation

[Copy and paste text/Start writing here.]

IV. Study findings

[Copy and paste text/Start writing here.]

A. Implementation study findings

[Copy and paste text/Start writing here.]

B. Impact study findings

[Copy and paste text/Start writing here.]

[Copy and paste Tables IV.1 and IV.2 here.]

V. Conclusion

[Copy and paste text/Start writing here.]

VI. References

[Copy and paste text/Start writing here.]

Appendix A: Data collection efforts

[Copy and paste text/Start writing here.]

[Copy and paste Table A.1 here, if used.]

Appendix B: Implementation evaluation data collection

[Copy and paste Table B.1 here, if used.]

Appendix C: Study sample

[Copy and paste Table C.1a here, if used.]

[Copy and paste Table C.1b here, if used.]

Appendix D: Implementation evaluation methods

[Copy and paste Table D.1 here, if used.]

Appendix E: Sensitivity analyses

[Copy and paste text/Start writing here.]

[Copy and paste Table E.1 here, if used.]

[Copy and paste Table E.2 here, if used.]

Data used to address implementation research questions *(example data included in italics for expository purposes)*

Implementation element	Types of data used to assess whether the element of the intervention was implemented as intended	Frequency/sampling of data collection	Party responsible for data collection
Adherence: How often were sessions offered? How many were offered?	*e.g., All sessions offered are captured in MIS* *Length (number of minutes) of program sessions captured in MIS*	*e.g., All sessions delivered are captured in MIS* *Session length sampled once a week*	*e.g., Program staff* *Program staff*
Adherence: What and how much was received?	*e.g., Daily attendance records*	*e.g., Student attendance at all sessions is captured in MIS*	*e.g., Program staff*
Adherence: What content was delivered to youth?	*e.g., Number of topics covered captured on observation spreadsheet*[a]	*e.g., Classroom observations occurred twice a year*	*e.g., Evaluation staff*
Adherence: Who delivered material to youth?	*e.g., List of staff members hired and trained to implement program* *Background qualifications of staff members from staff applications*	*e.g., Data on all staff members are available to program staff*	*e.g., Program staff*
Quality: Quality of staff-participant interactions	*e.g., Observations of interaction quality using protocol developed by evaluators*	*e.g., Convenience sample of 10% of classroom sessions were selected for observation*	*e.g., Evaluation staff*
Quality: Quality of youth engagement with program	*e.g., Observations of engagement using the YPQA*	*e.g., Random sample of 5% of all sessions were selected for observation*	*e.g., Evaluation staff.*
Counterfactual: Experiences of comparison condition	*e.g., Survey items on baseline and follow-up assessments* *Focus groups of comparison group members*	*e.g., Pre- and post-intervention* *Convenience sample of comparison group participants (once)*	*e.g., Evaluation staff*

Implementation element	Types of data used to assess whether the element of the intervention was implemented as intended	Frequency/sampling of data collection	Party responsible for data collection
Context: Other TPP programming available or offered to study participants (both intervention and comparison)	*e.g., District website listing all TPP programming* *Interview with school district curriculum director*	*e.g., Ad hoc* *Once per year*	*e.g., Evaluation staff* *Evaluation staff*
Context: External events affecting implementation	*e.g., News sources indicated school closure list*	*e.g., Ad hoc*	*e.g., Program staff*
Context: Substantial unplanned adaptation(s)	*e.g., adaptation request, work plan, 6-month progress report, annual progress report*	*e.g., Annually, ad hoc*	*e.g., Program staff, project director, evaluation staff*

[a] It is expected that OAH-approved facilitator logs will be used for this data collection.

TPP = Teen Pregnancy Prevention.

APPENDIX E

Appendix E. Consolidated Framework for Implementation Research (CFIR) Coding Schema Spreadsheet

Domain	Original Element name	Adapted Element Name; 1st Cycle Coding (L1)	Short Code	Domain Sub-Grouping; 2nd Cycle Coding (L2)	Short Code	Domain-Specific Small Group; 3rd Cycle Coding (L3)	Short Code
1	**Intervention Characteristics**	Intervention	**INT**				
				1.1 Innovation Source	**SOURCE**		
				1.2 Evidence Strength & Quality	**EVI STRENGTH**		
				1.3 Relative Advantage	**ADVAN**		
				1.4 Adaptability	**ADAPT**		
2	**Outer Setting**	Community	**COM**				
				2.1 Needs & Resources of Those Served by the Organization	**NEED ASS**		
				2.2 Cosmopolitanism	**NETWORKS**		
				2.3 Peer Pressure	**COMPETITION**		
				2.4 External Policy & Incentives	**EX POLICY**		
3	**Inner Setting**	Organization	**ORG**				
				3.1 Structural Characteristics	**STRUCTURE**		
				3.2 Networks & Communications	**ORG COMM**		
				3.5 Readiness for Implementation	**READY**		

						3.5.2 Available Resources	**AVAIL RES**
4	**Characteristics of Individuals**	Facilitators	**FAC**				
				4.1 Knowledge & Beliefs about the Innovation	**KNOW & BELIEVE**		
				4.2 Self-Efficacy	**EFFICACY**		
				4.3 Individual Stage of Change	**STAGE OF CHANGE**		
				4.4 Individual Identification with Organization	**ID with ORG**		
				4.5 Other Personal Attributes	**PERSONAL TRAITS**		
5	**Process**	Process	**PROC**				
						5.2.4 External Change Agents (Engage)	**EXT CHANGE AGENTS**
				5.3 Executing	**EXECUTE**		
				5.4 Reflecting & Evaluating	**REFLECT**		

APPENDIX F

Appendix F. Office of Adolescent Health Performance Measures and Data Collection Code Schema

Column1	Code Stem	Implementation Element Question	Question # Code	Types of Data used to assess whether the element of the intervention was implemented as intended	Example Code1	Frequency/sampling of data collection	Example Code2	Party Responsible for data collection	Example Code3	Method used to address each implementation element	Example Code4	Implementation Evaluation Findings/Results	Example Code5
Implementation Element				**TYPE DATA**		**FREQ DATA**		**PARTY DATA**		**IMP METHOD**		**IMP FIND**	
Adherence	AD	Q1. How often were sessions offered? How many were offered?	ADQ1	**TYPE DATA**	ADQ1 TYPE DATA	**FREQ DATA**	ADQ1 FREQ DATA	**PARTY DATA**	ADQ1 PARTY DATA	**IMP METHOD**	ADQ1 METHOD	**IMP FIND**	ADQ1 IMP FIND
	AD	Q2. What and how much was received?	ADQ2	**TYPE DATA**		**FREQ DATA**		**PARTY DATA**		**IMP METHOD**		**IMP FIND**	
	AD	Q3. What content was delivered to youth?	ADQ3										
	AD	Q4. Who delivered material to youth?	ADQ3	**TYPE DATA**		**FREQ DATA**		**PARTY DATA**		**IMP METHOD**		**IMP FIND**	
Quality	QL	Q1. Quality of Staff-participant interactions.	QLQ1	**TYPE DATA**		**FREQ DATA**	QLQ1 FREQ DATA	**PARTY DATA**	QLQ1 PARTY DATA	**IMP METHOD**	QLQ1 METHOD	**IMP FIND**	QLQ1 IMP FIND
Counterfactual	CF	Q1. How often were sessions offered? How many were offered?	CFQ1	**TYPE DATA**	CFQ1 TYPE DATA	**FREQ DATA**	CFQ1 FREQ DATA	**PARTY DATA**	CFQ2 PARTY DATA	**IMP METHOD**	CFQ1 METHOD	**IMP FIND**	CFQ1 IMP FIND
	CF	Q2. What and how much was received?	CFQ2	**TYPE DATA**		**FREQ DATA**		**PARTY DATA**		**IMP METHOD**		**IMP FIND**	
	CF	Q3. What content was delivered to youth?	CFQ3	**TYPE DATA**		**FREQ DATA**		**PARTY DATA**		**IMP METHOD**		**IMP FIND**	
	CF	Q4. Who delivered materials to youth?	CFQ4	**TYPE DATA**		**FREQ DATA**		**PARTY DATA**		**IMP METHOD**		**IMP FIND**	
Context	CON	Q1. Other TPP programming available or offered to study participants (Both intervention & comparison)	CONQ1	**TYPE DATA**	CONQ1 TYPE DATA	**FREQ DATA**	CONQ1 FREQ DATA	**PARTY DATA**	CONQ1 PARTY DATA	**IMP METHOD**	CONQ1 METHOD	**IMP FIND**	CONQ1 IMP FIND
	CON	Q2. External events affecting implementation	CONQ2	**TYPE DATA**		**FREQ DATA**		**PARTY DATA**		**IMP METHOD**		**IMP FIND**	
	CON	Q3. Substantial unplanned adaption(s)	CONQ3	**TYPE DATA**		**FREQ DATA**		**PARTY DATA**		**IMP METHOD**		**IMP FIND**	
Total = 13 OAH evaluation reports included implementation performance measures (Adherence, Quality, Counterfactual, and Context) and data collection questions (Type, Frequency, Party Responsible, Method, Findings)													